AKKORK

Agency for Quality Assurance in Higher Education and Career Development

Approved by

Chairman of the Advisory Council

_____ Shadrikov V.

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REPORT
on the results of an external evaluation of the educational program "Chemistry, Physics and Mechanics of Materials" in the field of estudy 04.03.02 Chemistry, physics and mechanics of materials St. Petersburg State University

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SUMMARY OF THE PROGRAM

The educational program "Chemistry, Physics, and Mechanics of Materials" is implemented in the field of education 04.03.02 by the Chair of Electrochemistry and leads to the award of a Bachelor's qualification. The program is managed by O. Levin, associate professor of the Chair of Electrochemistry.

A site visit as part of the external evaluation of the educational program was carried out by AKKORK experts from September 17 to September 18, 2019.

Strengths of the program under evaluation

HEI is a leader in the training of specialists in the subject field "Natural Sciences. Chemistry", has a clear strategy for the development of the educational program, based on advancing the quality of education as the main goal and priority criterion for assessing the effectiveness of graduates training, and implemented through strategic management.

The program provides graduates with high-level knowledge which is recognized and in demand both on regional and federal labor markets. All employers noted a high level of basic knowledge of graduates.

St. Petersburg State University has a clear system for ensuring internal quality control of education. Student councils, academic councils and Teaching and learning commissions for monitoring the quality of education were organized. The students survey contributes to improving the quality of educational services, the monitoring results are published, discussed and affect the content and implementation of the educational program.

The Teaching and Learning commission and the Council of educational programs include representatives of employers.

The program is aimed at the maximum fulfilment of the requirements of employers without a rigidly fixed further place of work.

The Bachelor program is well organized and fits well into the clear structure of the Bachelor-Master-Postgraduate Student of the University. Master's programs 04.04.01 "Chemistry" and 04.28.04 "Nanosystems and nanomaterials" are an effective way to continue the research of a Bachelor's graduate. The level of EP corresponds to the level of programs implemented in some highly rated universities in the United States.

The structure of the planned outcomes of the mastering of the educational program includes professional competencies developed on the basis of professional standards and types of economic activity.

The student has the opportunity to form an individual learning path based on the Variable part. Students are aware of their rights in the process of educational learning paths formation.

The teaching aids are regularly updated and reviewed, they reflect the current state of science. To implement training courses (modules) platforms and e-learning tools are used.

The program has a highly qualified Teaching staff. High-level research work is carried out.

HEI provides wide online access for all participants of the educational process to information resources that meet all modern criteria.

The study program is clearly focused on involving the student in research at St. Petersburg State University and partner institutes. Students successfully publish articles and participate in scientific conferences. Scientific research implementation is an integral part of maintaining the competencies of the teacher of EP “Chemistry, Physics and Mechanics of Materials”.

A system of continuing education is being implemented, both the College-University system and the School-College-University system.

Weaknesses of the program under evaluation

The educational services provided need further improvement.

There is no information confirming the sustaining at the workplace (in accordance with the competencies mastered in the framework of the educational program). If one considers the continuation of training in educational programs of the magistracy ("Chemistry", "Fundamental and Applied Aspects of Nanomaterials and Nanotechnology", "Chemistry, Physics and Mechanics of Materials") and postgraduate studies, the number of places does not provide the opportunity to continue training for 100% of graduates with a bachelor's degree. Lack of analysis of the demand for graduates, analysis of the place and role of the program in the federal and regional labor markets, and analysis of the quality of learning outcomes in the EP can lead to the mismatch of learning outcomes with market needs and to the narrowing of the circle of potential employers. High-quality basic education and interdisciplinary training to a greater extent allows the graduate to continue the studies in a magistracy or work in research laboratories than to continue professional activity in high-tech companies where knowledge of process technology is needed. However, it was noted that not all the graduates had fully formed competencies that characterize person’s personal qualities, which are an integral part of the professional competence, as well as competencies aimed at developing, maintaining and improving communications (independence, critical attitude, communication skills in English). Detailed information about the program must be posted on the website of the Institute of Chemistry in the section For the Applicant or Student.

There are no rules and safety instructions in some educational and research laboratories.

There are no basic Chairs, but for educational programs with a non-technological focus, these indicators might not be evaluated. Currently, there is no admission to the Master's program 04.04.02 - Chemistry, Physics and Mechanics of Materials.

Not enough places available in the program. Due to the small number of students, the realization of the scientific potential of the Chairs is worsening,

difficulties arise in recruiting students for additional courses, and the potential number of bachelors willing to look for work after completing EP decreases.

The variable part of the program requires an enlargement of courses with the formation of a clear modular program that will increase student mobility. The claimed training in English and Russian is not implemented.

The motivation of the teaching staff to effective educational activities is low. The percentage of teaching staff satisfaction with the motivation system is also low.

The auditorium of the Institute of Chemistry of St. Petersburg State University is not used effectively.

The building of the Institute of Chemistry of St. Petersburg State University is not suitable for the training of disabled people and people with disabilities. The available technological means of e-learning, network and distance learning systems do not allow to form the entire set of student competencies provided by the EP.

The main recommendations for the program under evaluation

Experts recommend to organize a service for monitoring the demand for graduates of the program. It is necessary to develop the institution of targeted training and internships in EP for communication with corporate communities for adaptation of the graduate upon completion of training. It is necessary to work closely with employers.

To exclude all instrumentation that does not comply with current safety standards from the educational process. To develop, approve and implement safety regulations for work in *all* chemical laboratories at the Institute of Chemistry of St. Petersburg State University.

Correlate the competencies of graduates with possible labor functions in the field of professional activity. To revise the planned learning outcomes from the point of view of the competency-based approach, taking as a basis the “Analytical report on the results of the survey of employers”. The practice of conducting master classes by leading specialist employers should be introduced. To increase the share of GQW, the results of which have practical application in the industry.

It is necessary to review the workload of the modules to bring them in line with ECTS credits requirements. Grade distribution tables should be included in the Diploma Supplement to translate grades into ECTS grades. The Vice-Rector needs to develop the rules of the procedure.

The content of most lectures must be made available through the Blackboard or in the form of hand-outs; harmonize with the content of leading foreign textbooks, which can increase the mobility and recognition of the program abroad.

The curriculum of the program must be translated into workload intensity measures - credit units with a distribution by semesters and types of workload (lectures, practical training, individual work, evaluation and consultations). An increase in the number of exams would improve control over the results of mastering of the educational program. Learning paths held in English are necessary not only for foreign students.

There is a special training function ("extra" courses for several students) that should be retained, but for this, the HEI should amend the Regulation on the minimum number of students in a course.

It is necessary to create a department that will deal with the search for large employers and contacts with them to update the EP.

It is necessary to adjust the teaching staff training in additional professional programs according to the profile of pedagogical activity in accordance with the recommendations of the professional standard.

It is necessary to revise the process of competency-based assessment of teaching staff and the record of the results of the educational process.

It is necessary to conduct an audit of the effectiveness of the classroom fund usage.

It is necessary to analyse the feasibility of increasing the percentage of e-learning accompanying courses usage up to 100%.

It is necessary for the administration of the HEI to consider the possibility of training people with disabilities with the formation of all the competencies provided by the EP in this field of education.

It is necessary to take into account the wishes of EP participants when drawing up the work schedule of the centers of the St. Petersburg State University Research Park.

It is necessary to develop and implement a personal account of the teacher, supporting the function of messages exchange.

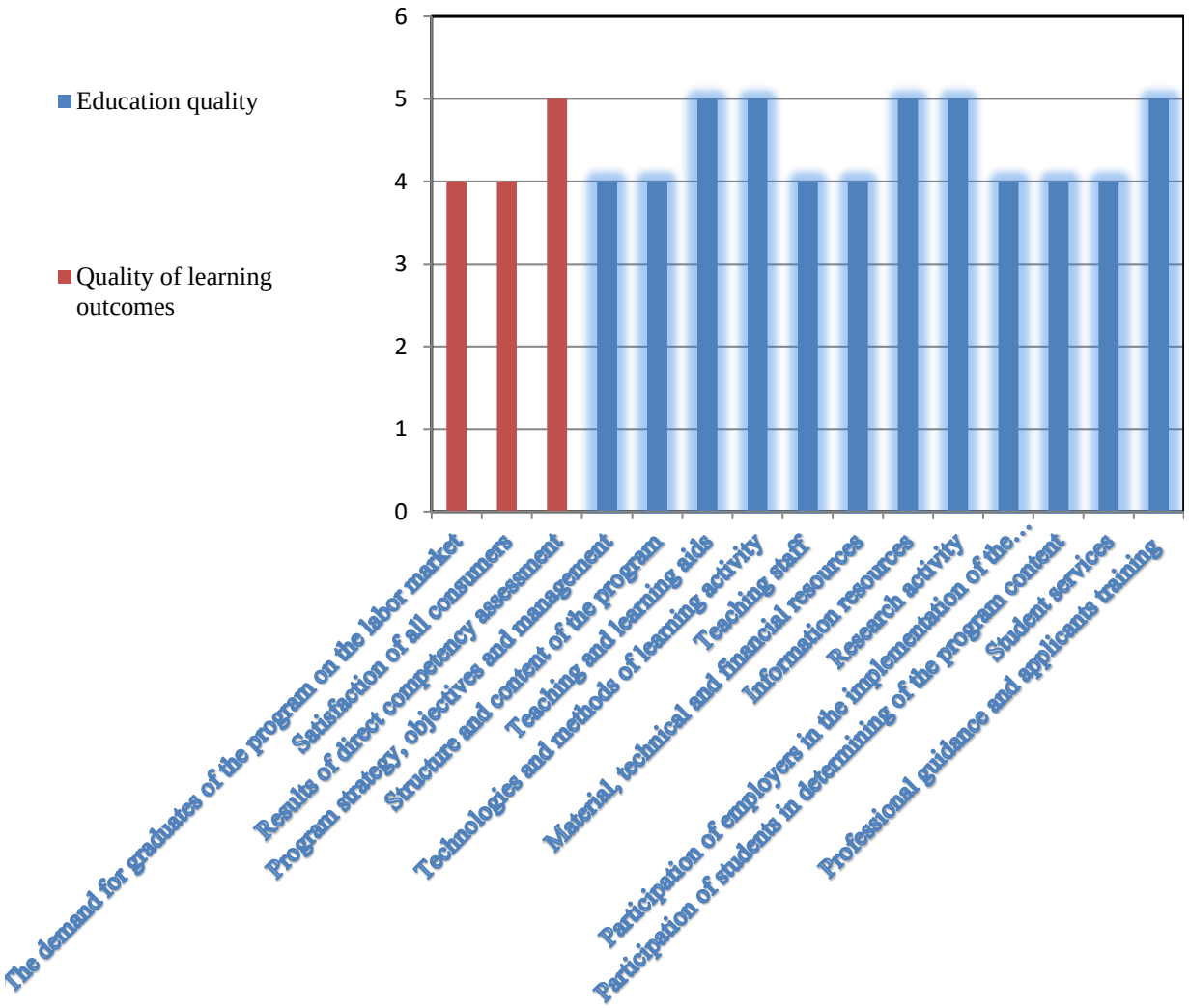
It is necessary to work on increasing employer loyalty to Bachelor students by organizing practices with potential employers leading to a closer interaction between them in a business environment.

Assessment of learning outcomes and quality assurance of education

No.	Criterion		Assessment
I	*Quality of learning outcomes*		
	1.	The demand for graduates of the program on the labor market	*4*
	2.	Satisfaction of all consumers	*4*
	3.	Results of direct competency assessment	*5*
II	*Education quality assurance*		
	1.	Program strategy, objectives and management	*4*
	2.	Structure and content of the program	*4*
	3.	Teaching and learning aids	*5*
	4.	Technologies and methods of learning activity	*5*
	5.	Teaching staff	*4*

	6.	Material, technical and financial resources	*4*
	7.	Information resources	*5*
	8.	Research activity	*5*
	9.	Participation of employers in the implementation of the educational program	*4*
	10.	Participation of students in determining of the program content	*4*
	11.	Student services	*4*
	12.	Professional guidance and applicants training	*5*

Assessment of learning outcomes and quality assurance of education



QUALITY OF LEARNING OUTCOMES

1. Demand for graduates of the program on federal and regional labor markets

Criterion grade: good

Experts rated the criterion "*Demand for graduates of the program on the labor market*" as *good*, since the results of a survey of graduates did not have reliable data (Appendix 17), which was associated with a small sample size. However, the mastering of the Bachelor program in Chemistry, Physics and Mechanics of Materials, as an interdisciplinary educational field of training in the field of natural sciences, which is implemented at the leading classical university of Russia, is one of the main criteria for the decision of hiring a specialist (Appendix 19, discussions with graduates and employers during the site visit to the HEI).

Analysis of the role and place of the program

- *The need of the region for graduates of this field (including the availability and characteristics of city-forming enterprises providing employment bases for graduates)*

There are no studies confirming the presence of the chemist profession in the lists of the most popular professions of recent years and in the near future on the federal and regional labor markets.

According to Profi.ru, in 2019, 201 chemist vacancies were opened with an average salary of 34,310 rubles in the country. The first place in the ranking of demand is occupied by a chemical engineer - 65 vacancies. In second place is a chemist technologist - 31 vacancies. The third and fourth places in the ranking are occupied by the specializations of a chemist (29 vacancies) and a chemist analyst (19 vacancies). There are 10 vacancies for laboratory chemists and 3 for expert chemists.

The results of the assessment of the demand for chemists on the labor market by Russian regions in 2019 show that the largest number of vacancies are in Moscow and the Moscow region (30 and 25, respectively). 21 chemist vacancies have been opened in St. Petersburg.

The average salary of chemists in St. Petersburg is 39150 rubles, which is 2175 rubles less than the average salary of chemists in Moscow and 7830 rubles less than the same indicator for the Kaluga region, which ranks first in this rating. The maximum average salary of chemists and analysts is 44,370 rubles. In second place is a chemist technologist with 36975 rubles. Next come the chemist laboratory assistant (29362.5 rubles), the engineer chemist (26926 rubles) and the chemist (25230 rubles).

- *The educational policy of the regional (municipal) administrations*

The region's educational policy is determined by Decree of the Government of St. Petersburg dated June 4, 2014 No. 453 "On the State Program of St. Petersburg "Development of Education in St. Petersburg"", which does not contain provisions on higher education and chemistry in particular, which does not indicate on the priority of the development of chemical specialties.

- *Description of the competitive environment in this area (number of universities in the region that train specialists in this field, their characteristics (status, ownership, number of students) and etc.)*

In total, as of 2019, there are 12 universities that teach in the specialty 04.03.02 "Chemistry, Physics and Mechanics of Materials". The field takes 155th place in the ranking of specialties according to the site Vuzoteka.ru.

In first place (according to the ranking of universities) is Moscow State University named after M.Lomonosov. In 2019, the number of budget places in this specialty was 25. The second place is occupied by St. Petersburg State University (10 places). Next are the Ural Federal University named after B. Yeltsin (25 places in 2019), Voronezh State University (18 places), Perm State National University, Samara State Technical University, Mordovian State University named after N. Ogaryov, Bashkir State University, Izhevsk State Technical University named after M.T. Kalashnikov, Voronezh State Technical University, Udmurt State University, Kalmyk State University named after B.B. Gorodovikov, Obninsk Institute of Atomic Energy National Research Nuclear University MEPhI, University of Dubna.

In the study region, training in the specialty 04.03.02 is carried out only at St. Petersburg State University.

Analysis of the data submitted by the university (conclusions)

- *The proportion of students who combine study at a university with work in the specialty profile*

There are no students combining university studies with work in the specialty profile. This is due to the high workload of students who are not able to simultaneously study and work.

- *The proportion of the contingent of graduates employed within one year after graduating from a public educational institution in the field of training (specialty) obtained as a result of training on the educational program*

Only one graduate of the Bachelor program of the specialty 04.03.02 "Chemistry, Physics and Mechanics of Materials" found a job after completing the course, but not in the field of training. The remaining students continued their studies in the magistracy.

- *The share of the contingent of graduates employed at the request of enterprises*

There are no such graduates.

- *The proportion of students enrolled by order of employers, for example, on the basis of tripartite (targeted) agreements*

No data to evaluate.

- *The share of the contingent of graduates working in the field of training in the region*

There are no such graduates.

- *The share of the contingent of graduates working in the training profile outside the region*

There are no such graduates.

- *Number of complaints on graduates*

None identified.

- *The number of positive feedback from organizations about the work of graduates*

11 out of 11 (100%).

- *Proportion of students in the EP enrolled in Master programs who have completed Bachelor programs.*

10 out of 11 (91%).

- *The proportion of graduates of the EP of this HEI in relation to the share of graduates of all other universities in the region in the educational program.*

100%. St. Petersburg State University is the only university in the region that educates students in this specialty.

Additional material

Data on the demand for graduates have been presented according to the results of a self-evaluation conducted by the educational organization. According to the results of a survey of graduates, there are no reliable data (Appendix 17), which is associated with a small sample size. The data for evaluating the criterion were obtained during interviews with graduates and employers during the site visit to the HEI.

2. Satisfaction of consumers with learning outcomes

Criterion grade: good

Experts rated the criterion "*Satisfaction of all consumers with learning outcomes"* as *good*, since the competencies of graduates fully complied with modern requirements for industry experts.

- *The proportion of employers who believe that the competencies of the graduates of the program:*

• *fully meet the requirements for modern industry experts*

1 (7.7%)

• *basically correspond to modern requirements for specialists in this field, but there are minor comments*

12 (92.2%)

• *few graduates whose competencies correspond to modern requirements for specialists in this field*

0

• *do not meet the requirements for specialists in this field*

0

• *The proportion of graduates satisfied with the learning outcomes*

The only graduate who graduated from this Bachelor program and did not continue his studies in the magistracy, expressed satisfaction with the learning outcomes. Among students studying in this program, 67% are mostly satisfied with the structure of the program, 11% are more dissatisfied, 22% find it difficult to answer.

3. Direct competency assessment by experts

Criterion grade: excellent

Experts rated the criterion "*Level of competency formation"* as *excellent*, since the actual learning outcomes are largely consistent with the expected learning outcomes.

During the site visit, the expert conducted a direct assessment of the competencies of the graduate students. 4-year students in the amount of 4 people took part (31% of the final course) in the direct assessment.

During the direct assessment of graduates, control and measurement materials prepared by experts were used.

In order to analyse the development of competencies the expert chose the following one:

• Evaluation of direct assessment of competencies that characterize the personality and that are an integral part of his / her professional competence:

UC-1 Able to search, implement critical analysis and synthesis of information, apply a systematic approach to solving the tasks;

UC-2 Able to determine the range of tasks within the framework of the goal and choose the best ways to solve them, based on existing legal norms, available resources and restrictions;

PCP-2: Able to apply the skills of planning and conducting chemical experiments, methods of recording and processing their results, able to organize one's work.

• Evaluation of direct assessment of social competencies aimed at the development, maintenance and improvement of communication

OPC-6: Able to present the results of professional activities in the form of test reports, progress reports, abstracts, presentations.

• Evaluation of professional competencies ("core competencies") including competencies which reflect the demand (needs) of the federal and/or regional labor markets depending on the major employers of the graduates of the program

OPC-2: Able to conduct, in compliance with safety standards, an experiment on the synthesis and analysis of chemicals, the study of reactions, processes and materials, the diagnosis of physical and mechanical properties of materials.

PCP-1: Able to use the fundamentals of modern physical methods for substances research, possess skills of working with modern scientific equipment, and be able to correctly interpret the results.

In the process of direct assessment of competencies, the experts used the following control and measurement materials: an interview on the results of students' research work (term paper) - the goals and objectives of the study, the main tools, theoretical foundations, interpretation and presentation of the research results.

According to the results of a direct assessment of competencies, experts identified

Level / Students ratio	Sufficient level (have managed to solve 80% of the proposed tasks)	Acceptable level (the percentage of solved tasks from 50 to 79%)	Low level (percentage of solved tasks is less than or equal to 49%)
The results of direct assessment of competencies that characterize the personality and that are an integral part of his/her professional competency			
75%	+		
25%		+	
The results of direct assessment of social competencies aimed at the development, maintenance and improvement of communication			
75%	+		
25%		+	
The results direct assessment of professional competencies (“core competencies”) including competencies which reflect the demand (needs) of the federal and/or regional labor markets depending on the major employers of the graduates of the program			
100%	+		

When conducting the education quality assessment, the experts got acquainted with 3 (number) of GQW, which amounted to 33% of the final works of the last year in this area. The experts concluded that the examined GQW **meet /** do not meet all the requirements stated below.

GRADUATION QUALIFICATION WORK

No.	Objects of estimation	Comments of experts
1.	The topic of GQW corresponds to the field of degree and the current level of development of science, equipment and (or) technology in the field of the program.	100%
2.	The tasks and contents of the GQW are aimed at confirming the competencies formation of the graduate.	100%
3.	The degree of use of the materials collected or	100%

	received during the pre-graduation practical training and the preparation of term papers in the independent research units of the GQW.	
4.	The topic of GQW is defined by the requests of the industry organizations and the tasks of the experimental activity solved by the teachers of EI.	100%
5.	The results of GQW find practical application in the industry.	66%
6.	The degree of use of the results of the R&D of the Chair, faculty and third-party research and production and/or research organizations in the implementation of independent research parts of the GQW.	100 %

Conclusions and recommendations of experts

Conclusions

The program provides graduates with high-level knowledge recognized and demanded both on regional and federal labor markets, which was confirmed during interviews with graduates and representatives of employers. However, there is no sufficient information for a competent assessment of the indicator due to the small sample size. There is no information confirming the sustaining of the graduate at the workplace (in accordance with the competencies mastered in the framework of the accredited educational program). If one considers the continuation of training in educational programs of the magistracy ("Chemistry", "Fundamental and Applied Aspects of Nanomaterials and Nanotechnology", "Chemistry, Physics and Mechanics of Materials") and postgraduate studies, the number of places does not provide the opportunity to continue training for 100% of Bachelor graduates.

High-quality basic education and interdisciplinary training to a greater extent allow the graduate to continue the studies in a magistracy or work in research laboratories than to continue professional activity in high-tech companies where knowledge of process technology is needed. All employers noted a high level of basic knowledge of graduates. However, it was noted that not all the graduates had fully formed competencies that characterized the person’s personal qualities, which were an integral part of the professional competence, as well as competencies aimed at developing, maintaining and improving communications (independence, critical attitude, communication skills in English).

A direct assessment of the competencies formed as a result of the EP mastering showed that the students were mostly well prepared, had high-quality basic knowledge, with the exception of some “soft skills”.

Recommendations

Organize a service for monitoring the demand for graduates of the program. It is necessary to develop the institution of targeted training in EP for communication with corporate communities, for adaptation of the graduates upon completion of training. An analysis of the demand for graduates, an analysis of the place and role of the program in the federal and regional labor markets, and an analysis of the quality of learning outcomes of the EP are needed. Lack of analysis can lead to a mismatch of learning outcomes with market needs and a narrowing of the range of potential employers.

Correlate the competencies of graduates with possible labor functions in the field of professional activity. Review the planned learning outcomes from the point of view of the competency-based approach, taking as a basis the “Analytical report on the results of the survey of employers” (Appendix 19). The practice of conducting master classes by leading specialist employers should be introduced.

Attention should be paid to the formation of competencies aimed at developing students' critical and global thinking in the framework of the research tasks assigned to them; the development of the ability to independently determine promising areas and ways to solve the tasks; increase the level of English proficiency to a sufficient one for working with scientific literature and for participating in scientific discussions. It is necessary to enable the student to gain in-depth knowledge in related fields (technological and language skills). It is necessary to increase student mobility within St. Petersburg State University (to allow choosing disciplines of other EP). To increase the share of GQW, the results of which are practically applied in the industry.

Additional material

According to the results of a students survey of the program by the educational organization, data were presented that were confirmed by experts during the site visit.

QUALITY ASSURANCE OF EDUCATION

1. Strategy, objectives and program management. Internal quality assurance system

Criterion grade: Good

Program strengths

The HEI is a leader in the training of specialists in the subject field "Natural Sciences. Chemistry", has a clear strategy for the development of the educational program, based on advancing the quality of education as the main goal and priority criterion for assessing the effectiveness of graduates training, and implemented through strategic management.

St. Petersburg State University has a clear system for ensuring internal quality control of education. Student councils, EP councils and Teaching and Learning commissions for monitoring the quality of education were organized. The students survey contributes to improving the quality of educational services, its results are published discussed and then affect the content and implementation of educational program.

The Learning and Methodical commission and the Council of educational programs include representatives of employers.

The program is aimed at the maximum fulfilment of the requirements of employers without a rigidly fixed further place of work. Detailed information about the program must be posted on the website of the Institute of Chemistry in the section For the Applicant or Student. It is necessary to familiarize students with the purpose of the educational program in the 1st year of study (within the framework of the discipline "Adaptation and training at the University") in order to form a motivated approach to learning for students and a holistic understanding of the educational process.

Recommendations

Learning paths held in English are necessary not only for foreign students. There is no system of practices in enterprises. Implementation of targeted training is needed.

It is necessary to specify the goal of the program, taking into account the specifics of the educational institution, the specifics of the region and the needs of employers, aimed at developing students' personal and communicative qualities. It is necessary to bring the actual outcomes of training in line with the planned outcomes, and with the needs of the employer to increase the competitiveness of graduates.

It is necessary to review the workload of the modules to bring them in line with ECTS credit requirements. Create a clear distribution of the different types of teaching workload (lectures, practical training, individual work, supervision and

consultations). Grade distribution tables should be included in the Diploma Supplement to translate local grades into ECTS grades. The Vice Rector needs to develop the rules of procedure.

Additional material

Analysing the facts stated by the educational organization in the self-evaluation report, the experts came to the conclusion that the data presented were relevant and reliable.

During the site visit, the experts held meetings with the administration, interviewed the Head of the program, students, teachers, and employees.

2. Structure and content of the program

Criterion grade: Good

Program strengths

This Bachelor program is well organized and fits well into the clear Bachelor-Master-Postgraduate Student structure of the University. Master's programs in the fields 04.04.01 - Chemistry and 04.04.04- Nanosystems and nanomaterials are an effective way to continue the research of a Bachelor's graduate. The content of the basic (mandatory) disciplines of the chemical, physical and biological modules is carefully thought out, which makes it possible to expand and (or) deepen knowledge, skills, competencies within the variable (profile) part of the program for successful professional activities implementation and (or) continuing professional education in the magistracy. The level of the EP corresponds to the level of programs implemented in some highly rated universities in the United States.

The structure of the planned outcomes of the educational program mastering includes professional competencies developed on the basis of professional standards and types of economic activity.

The student has the opportunity to form an individual learning path on the basis of the Variable part. Students are well informed on the process of individual educational learning paths formation.

Recommendations

Currently, there is no admission to the Master's program 04.04.02 - Chemistry, Physics and Mechanics of Materials. There is a special training function (“extra” courses for several students) that should be retained, but for this, the HEI should amend the Regulation on the minimum number of students in a course. Not enough places available in the program. Moreover, the program is in demand among applicants (the competition consistently exceeds 4 people per place, which is much higher than the competitions in other universities of St. Petersburg with a chemical focus with a significantly larger number of places).

The content of most lectures must be made available through the Blackboard or in handouts. The content of the basic lecture courses must be harmonized with

the content of leading foreign textbooks, which can increase the mobility and recognition of the program abroad.

The variable part of the program requires an enlargement of courses with the formation of a clear modular program that will increase student mobility**.** For disciplines that are implemented in the forms of online courses, forms of current control or interim evaluation are provided, but hours for the corresponding type of control are not allocated. The curriculum of the program must be translated into workload intensity measures - credit units with a distribution by different types of teaching workload (lectures, practical training, individual work, supervision and consultations) and semesters. An increase in the quantity of exams would improve control over the results of the educational program mastering. Learning paths held in English are necessary not only for foreign students.

There are the Order No. 9062/1 of September 15, 2017 "On the accounting of the results of the work of the Councils of educational programs" and Order No. 9997/1 of October 16, 2018 "On the approval of the composition of the Teaching and Learning commission", but reports on the work of commissions and councils are not available. Access to them must be provided.

Not a high enough percentage of students who believe that the EP structure and content meet their expectations. However, timely information provision on the goals and structure of the educational program will allow the student to be able to adjust the individual learning path on time, which will increase the percentage of students satisfied with the content of the program.

Additional material

Analysing the facts stated by the educational organization in the self-evaluation report, the experts came to the conclusion that the data presented were relevant and reliable.

During the site visit, the experts held meetings with the administration, interviewed the Head of the program, and students. The work with documents, the analysis of term papers and GQW have been held.

3. Teaching and learning aids

Criterion grade: Excellent

Programme strengths

This Bachelor program provides an excellent opportunity to continue studying in various interdisciplinary Master's programs. Students with a higher level of education have the opportunity to temporarily travel abroad for internships. The teaching materials are regularly updated and reviewed; they reflect the current state of science. In the HEI various methods and forms of control and measurement materials are used.

Recommendations

From interviews with students, it became clear that they lack knowledge of real production processes. It is necessary to improve cooperation with industry partners in order to build students' understanding of production processes, technological aspects and skills of working with equipment.

Disciplines should be introduced into the program, that will summarize the knowledge gained on the everyday aspects of chemistry, physics and materials science to strengthen the intellectual aspects of the program. The same is necessary for industrial aspects, for example, introducing industrial visits (excursions) or compulsory summer internships. Discipline [058037] Philosophy (online course) should be moved to the 1-2 courses; the variable part of training is too overloaded (number of disciplines); disciplines should be combined into large modules; production practice should be introduced into the training; increase the range of disciplines taught in English, since the declared languages of teaching are English and Russian.

It is necessary to create a department that will deal with the search for large employers and contacts with them to update EP.

Additional material

During the site visit, the experts examined the teaching and learning aids developed in the educational organization. Experts concluded that the data presented were relevant and reliable.

According to the results of the student survey, the results of which were confirmed during the site visit, the majority of students (67%) believe that their opinion is not taken into account in the TLA update and development implementation. In this regard, experts recommend that the EP management actively engage students in the process of TLA development.

4. Technologies and methods of learning activity

Criterion grade: Excellent

Program strengths

The research method is intensively applied. Teachers, in the classes of which the experts were present during the site visit to the HEI, were very well prepared and showed mastery of interaction with students. Lectures were logically arranged. To implement training courses (modules), platforms and e-learning tools are used. The curriculum has several online courses: History of Russia, Digital Culture, Philosophy - 3% (7 credits) of the total program workload.

Recommendations

More modern teaching methods should be applied in the educational process when mastering basic courses. Traditional frontal lectures should be supplemented by self-study methods, problematic and contextual methods. Lecture halls need modernization. The list of employers involved in educational activities needs to be expanded.

Additional material

During the site visit, the experts attended a class, an analysis of which is presented below.

Name of teacher Alexey Timoshkin
Group / specialty 1 year, 04.03.02 Chemistry, physics and mechanics of materials
1. Discipline / module General chemistry
2. Type of training session
● lecture
● Seminar
● Laboratory class
● Practical session
●Integrated skills lesson
● Other_____
3. Theme of the lesson: Chemistry of the elements of the main subgroups
4. The purpose of the lesson: the development of the basic concepts of chemistry about the structure of matter
5. Objectives of the lesson: to teach students to use theoretical concepts to interpret the structure and properties of specific compounds
6. Material and technical support of the lesson:
Classrooms for lectures are equipped with furniture and a board for presenting educational information to a large audience.

7. Please List:

No.	Knowledge and skills that are planned to be formed in the lesson and competencies, the formation of which are affected by these knowledge and skills (should be voiced by the teacher of the lesson)	Forms, tools, methods and techniques that are planned to be used in the lesson to form the competency
1.	knowledge of basic concepts and laws of chemistry	Forms: interactive lecture, feedback; Means: visual, symbolic; Methods: problem statement, partial search, heuristic, research, reflexive; Techniques: analysis, comparison, classification, systematization.
2.	the ability to use these laws in problems solving related to the structure and properties of specific compounds	Forms: interactive lecture, feedback; Means: visual, symbolic; Methods: problem statement, partial search, heuristic, research, reflexive; Techniques: analysis, comparison,

		classification, systematization.
3.	the skill to carry out work on the synthesis of chemical compounds and the study of their properties	Forms: interactive lecture, feedback; Means: visual, symbolic; Methods: problem statement, partial search, heuristic, research, reflexive; Techniques: analysis, comparison, classification, systematization.

THE EVALUATION OF THE TEACHER

No	Analysis criteria	Indicator	Grade (0,1,2)
1.	Compliance with training session regulations	A timely beginning and ending of the lesson, time-balanced sections.	2
2.	Organizational process	Greeting. Communication of the topic, objective (the connection of the objectives to the competencies formed).	2
3.	Motivation of students for the upcoming activities	Indication on formation of the modern professional and / or social and personal competencies.	2
4.	Classroom climate	The presence of a positive emotional interaction between the teacher and the students; mutual goodwill and audience participation.	2
5.	The quality of presentation	Structuredness of the material; clarity of current tasks; consistency and comprehensibility of presentation; adaptation of the presentation to the specificity of the audience; availability of examples and relevant facts.	2
6.	Compliance of the content with the program course	To compare with the TLA.	2
7.	The usage of visual materials	Textbook, practical training, hand-outs, tables, illustrations, etc.	1
8.	Declamatory skills	Audibility, intelligibility, euphony, literacy, speech tempo; facial expressions, gestures, pantomime; emotional intensity of the performance.	2
9.	Sensitivity to the audience	The ability to react to the changes in the perception of the audience.	2
10.	Ethics		2
11.	Methods of attention organization and student behaviour regulation	Increase of interest among the audience (interesting examples, humour, rhetorical devices, etc.); involvement of the audience into a dialogue, in the process of tasks performance, etc. But it is unaccepted: to call upon the attention of the audience in an open form; to demonstrate disapproval; to use methods of psychological	2

		pressure, or blackmailing.	
12.	Maintaining the "feedback" with the audience in the course of the training session	Control of material understanding.	2
13.	Summing up of the lesson (organisation of reflection)	Organisation of the reflection process at the end of which all the students are actively involved in the discussion of the conclusions	2
14.	Looks	Compliance with the corporate identity, presentable appearance, charisma.	2
15.	Final evaluation		13
16.	Notes and reviewer recommendations: Lecture classrooms should be modernized.		

When analysing the self-evaluation report, the curriculum and class schedule, the experts determined that the share of classes conducted in an interactive form in the program as a whole is more than 50%. During the site visit, the TLA of five disciplines have been studied.

5. Teaching staff
Criterion grade: Good

Program strengths

The program has a highly qualified teaching staff. Research work is being carried out at a high level which allows conducting contractual activities with representatives of the labor market. The HEI has effective mechanisms for the selection of teaching staff. Evaluations of the pedagogical activities of teachers are regularly conducted. The scientific activities of teaching staff are monitored by the integrated assessment indicators prescribed in their contracts. During the evaluation, the results of the student survey are taken into account. The qualification of 100% of the teaching staff involved in the implementation of the EP corresponds to the field of training.

Recommendations

In accordance with the Order of the Ministry of Labor of Russia of 08.09.2015 N 608n "On the approval of the professional standard" Teacher of professional training, professional education and additional professional education "(Registered in the Ministry of Justice of Russia on 24.09.2015 N 38993), training in additional professional programs in the profile of pedagogical activity is recommended at least once every three years. Over the past 3 years (2015 - 2018),

100% of teachers were required to undergo continuing education. An additional list of teachers who have undergone advanced training is presented in the Appendix; the number of such teachers is only 11 people, which is 13.3% of the total number of teachers who implement the discipline. This must be adjusted in accordance with the recommendations of the professional standard.

There is a bias towards the choice of a teacher in terms of the effectiveness of scientific work, but not in the quality and effectiveness of the educational process that one provides. There is no motivation for the teaching staff for effective educational activities. The level of the teaching staff satisfaction with the motivation system is low. It is necessary to revise the process of competency-based assessment of teaching staff and the record of the results of the educational process.

Additional material

In the HEI self-evaluation report data on teaching staff satisfaction with the personnel policy and the current motivation system were presented. On the basis of the analysis of the data presented, experts concluded that the level of satisfaction with the teaching staff motivation system was low; therefore, they recommend that program managers review the process of teaching staff competency assessment.

According to the results of the interview, the experts conclude that there is a bias towards the choice of a teacher in terms of the effectiveness of scientific work, but not in the quality and effectiveness of the educational process, which one provides; therefore experts recommend to develop a comprehensive assessment of the teacher's R&D and teaching and learning activities.

Analysing the facts stated by the educational organization in the self-evaluation report, the experts came to the conclusion that the data presented were relevant and reliable.

6. Material, technical and financial resources of the program
Criterion grade: good

Program strengths

All EP participants can use the whole complex of material and technical resources of St. Petersburg State University.

The research part of the program is partially funded by the university. Additional funding for the program and its participants is partially provided by the effective labor contract, where as one of the duties of the employee it is indicated that one should conduct research work in the field related to the profile of the Chair and publish a certain number of articles per year in periodicals indexed on the Web platforms of Science Core Collection or Scopus. Also, teaching staff is involved in the implementation of research work under contracts with organizations.

The material and technical resources of St. Petersburg State University allow the usage of e-learning in the educational process. The curriculum includes online courses: History of Russia, Digital Culture, Philosophy - 3% (7credits) of the total program workload.

Recommendations

The conditions of the EP implementation are improving and need further improvement.

It is necessary to conduct an audit of the effectiveness of the classroom fund usage. The auditorium of the Institute of Chemistry of the St. Petersburg State University is not used effectively. Many classrooms are idle, renovation of premises is required.

During an interview with teachers, concern was expressed about the lack of licensed software for conducting research. It is necessary to assess the demand for this product and adjust procurement plans.

It is necessary to analyse the feasibility of increasing the percentage of e-learning accompanying courses usage up to 100%.

It is necessary for the administration of the HEI to consider the possibility of training people with disabilities with the formation of all the competencies provided by the EP in this field of education. The building of the Institute of Chemistry of St. Petersburg State University is not suitable for the training of people with disabilities. The available technological means of e-learning, network and distance learning systems do not allow to form the entire set of student competencies provided by the EP.

It is necessary to make the processes of formation and use of financial resources allocated for the implementation of the program as transparent as possible (discussion at the Academic councils of the University, the Institute of Chemistry and meetings of the Chair).

According to indirect indicators of survey of students and interviews with them, there is a need to change the work schedule of the centers of the Research Park of St. Petersburg State University. It is necessary to take into account the wishes of the participants of EP when scheduling the work of the centers.

The educational materials of students include a significant proportion of outdated textbooks, including basic disciplines, which must be replaced by relevant and recognized publications. It is necessary to purchase educational literature in English.

Additional material

During the site visit, the experts interviewed students and teachers involved in the implementation of the program on their satisfaction with the quality of the classroom fund. The data obtained allow experts to conclude that the participants of the education process are satisfied with the quality of the classroom fund and recommend that program managers improve its use.

During the site visit to the educational organization, the expert team examined the material and technical base. Laboratory equipment details are provided below. The data presented allow experts to conclude that a significant part of the resources of St. Petersburg State University Research Park consists of modern equipment.

7. Information resources
Criterion grade: Excellent

Program strengths

The HEI provides wide online access for all participants of the educational process to information resources that meet all modern criteria. Each student and representative of the teaching staff of St. Petersburg State University has a multifunctional Personal Account.

Recommendations

It is necessary to review the locations of document files and optimize their search paths for the student.

It is necessary to develop and implement a personal account of the teacher, supporting the function of messages exchange.

Computers linked to the site of the HEI (providing access to the necessary information about the educational process to students who do not have personal means of access) should be available not only in an isolated room with a limited work schedule.

8. Research activity
Criterion grade: Excellent

If one does not take into account clause 10 (The percentage of students in EP who are winners of scientific grants (Russian, foreign, in % over the past three years), which can be considered excessive for students of the first-level educational program (Bachelor's degree), then the criterion can be estimated as *excellent*.

Program strengths

Bachelor students actively participate in research projects implemented through external and internal sources of financing within the framework of the GQW, forming their analytical and research competencies. The study program is clearly focused on involving the student in research at St. Petersburg State University and partner institutes. Students successfully publish articles and participate in scientific conferences. Scientific research implementation is an integral part of maintaining the competencies of the teacher of EP “Chemistry, Physics and Mechanics of Materials”.

Recommendations

The results of scientific research carried out in the field of the educational program should be more actively introduced into the practice of enterprises-employers with the maximum inclusion of future graduates as potential employees in real professional activities. It's recommended to intensify national and international student cooperation through information awareness about internships and practices.

Additional material

The documents on self-evaluation by the educational organization provided information on the results of the students survey "The impact of research on the quality of education". Experts have drawn conclusions about the high level of research and recommended paying more attention to the needs of the employer in terms of the formation of research topics.

The participation of students in scientific circles was analysed. For students of the program evaluated 47 research groups function at the Institute of Chemistry of St. Petersburg State University. The main goal of organizing scientific circles is to engage students in research. The number of students regularly attending scientific study group is 95%. On the basis of the work in scientific circles, students published scientific results in high-ranking journals:

Kondratyeva Ye.., Solovyeva E., Khripoun G., Mikhelson K., Non-constancy of the bulk resistance of ionophore-based ion-selective electrode: A result of electrolyte co-extraction or of something else?, Electrochim. Acta, 2018, 259, 458-465.

9. Employer participation in the program implementation

Criterion grade: Good

Program strengths

Close cooperation with employers and a significant influence of employers' representatives on the implementation of the program has been noted. Representatives of key employers' organizations are invited to the Council of EP, which is a deliberative body created to improve the effectiveness of training in the EP, quality control of implementation. Throughout the functioning of EP, all Teaching and Learning documentation is approved at meetings of the TLC, which on a compulsory basis includes employers. Some employees of the Chairs are part-time workers and work in external organizations-employers. Thus, the participation of employers in conducting meetings of the Chairs is ensured.

Tasks for the practices within the disciplines (undergraduate practice and research work) are formed on the basis of the students' GQW, which are agreed with employers.

Recommendations

Employers are mainly interested in hiring Masters, but not Bachelors, citing the lack of resources to develop the necessary competencies for potential employees. However, the bachelor in accordance with the training program has the

necessary set of basic knowledge and skills for subsequent employment. At the same time, employers confirm the necessary basic level of students. It is necessary to work on increasing employer loyalty to Bachelor students by organizing practices with potential employers leading to a closer interaction between them in a business environment.

More attention should be paid to the participation of employers in the formation of applied and communicative skills of students. For the development of communication skills, it is possible to introduce such courses as ethics in a business environment, business correspondence. Experts recommend teaching of management, oratory and presentation skills. It is advised to organize field trips, excursions and master classes in industrial enterprises to form a student's understanding of existing production technologies. It is also necessary to develop an understanding of the fundamentals of instrumental analysis methods, strengthen the practice of working with equipment, and introduce students to the basics of the production of various products.

Additional material

The self-evaluation report of the educational organization provides information on the results of a survey of employers regarding their satisfaction with the quality of graduate training. Employers noted that graduates lacked personal and communicative competencies.

10. Students' participation in the program contents determination

Criterion grade: Good

Program strengths

To ensure the possibility of communication between students and senior officials, a virtual reception at St. Petersburg State University was created. Assessment of the quality of education is implemented taking into account the results of student surveys that affect the development of the program.

Recommendations

A high percentage (78%) of students in the survey said that it was impossible to influence the educational process. Also, a lot of students pointed out that they were not aware if their opinion was taken into account in the process of TLA update. It is necessary to inform students about the possibility of the educational program formation, about updating the content of the program, about changes of courses and their complexity; to convey to students that their opinions also affect the improvement of the quality of education by posting the results of student satisfaction monitoring on the information resources of the HEI or organize student meetings to announce the results of work.

11. Student services a the program level
Criterion grade: Good

Program strengths

All students have access to various information services. The University has a Student Council. The leadership of the HEI financially encourages members of the Student Council and students receiving “excellent” grades. The Student Council is actively involved in student life, and is successful. Various mechanisms of material support for students have been developed, operating at the program level. All students participate in surveys on issues related to the implementation of EP. Students are informed about the results of the monitoring.

Recommendations

To the question "Do Chairs and faculty encourage your participation in determining the content of the program and the organization of the educational process?" only 22% of respondents gave a positive answer.

It is necessary to consider the administration of EI for the possibility of training people with disabilities with the formation of all the competencies provided by the EP in this field. The building of the Institute of Chemistry of St. Petersburg State University is not suitable for the training of people with disabilities. The available technological means of e-learning, network and distance learning systems do not allow to form the entire set of student competencies provided by the EP.

St. Petersburg State University has a program to promote the study of foreign languages, which, however, is paid. Detailed information about the opportunities to take training in additional courses and / or programs, such as internships abroad, including language and computer courses, various seminars and trainings, master classes, etc. must be placed on the website of the Institute of Chemistry in the section For the Applicant or Student, because the students survey showed dissatisfaction with the organization of practices and internships: not satisfied - 22%, find it difficult to answer - 44%, rather satisfied - 44%.

At St. Petersburg State University, there is no encouragement in the form of employer scholarships to students studying at state-financed or tuition fee places.

Student schedule flexibility is limited. It depends on the opening hours of the centers of the Research Park of St. Petersburg State University. Computers linked to the HEI website, which allow students to access the necessary information about the educational process, are available to students only in an isolated room (general access class of the Institute of Chemistry of St. Petersburg State University), which also affects the flexibility of students' schedules.

12. Professional guidance and applicants training

Criterion grade: Excellent

Program strengths

HEI is a leader in the training of specialists in the subject field "Natural Sciences. Chemistry", has a clear strategy for the development of the educational program, based on advancing the quality of education as the main goal of training graduates, and carried out by attracting the most trained applicants. For this, various mechanisms of interaction with educational institutions of the region, employers and government agencies are used to conduct joint academic contests, schools, competitions, etc. A system of continuing education is being implemented, both in the part of the College-University system and the School-College-University system. 100% of the students surveyed rated the organization of the admission process at St. Petersburg State University as satisfactory.

Recommendations

To establish closer interaction with employers to organize targeted training in the EP to increase the student contingent.

Additional material

Based on the results of the analysis of documents and meetings with the administration of the HEI and students, the experts received information about the number of events held during the last academic year. In total, 72 events were held in the course of the year, namely:

1. Open Doors Days;
2. Public lectures on the basis of St. Petersburg State University;
3. Introductory conversations, presentations on the basis of St. Petersburg State University;
4. Excursions at St. Petersburg State University. Acquaintance with the expositions and collections of St. Petersburg State University (as agreed);
5. Information meetings with students and parents in educational organizations;
6. Thematic events and open lessons of students of St. Petersburg State University. "Students at St. Petersburg State University School";
7. Scientific and practical training;
8. Activities for teachers (meetings, seminars, master classes).

Reviewers' CVs

Name of expert: Gergely Toth

Job location, title	Member of the Label Committee ECTN, former Vice president of the Institute of Chemistry, Budapest University.
Academic rank and degree	PhD, Associate Professor

Name of expert: Rublinetskaya Julia

Job location, title	Federal State Budgetary Educational Institution of Higher Education "SamSTU", Head of Chair
Academic rank and degree	Doctor of Chemical Sciences, Associate Professor
Education	University degree
Professional achievements	
Area of expertise	Electrochemistry, analytical and physical chemistry
Practical experience in the field of the program under evaluation	Scientific and pedagogical experience -19 years

Name of expert: Fedotov Mikhail

Job location, title	IMET RAS, Junior Research Fellow
Academic rank and degree	Candidate of Engineering Sciences
Education	Higher, Moscow State Technical University named after N.Bauman
Professional achievements	Participation in international scientific conferences, including those abroad. Granting under the UMNIK program. Participation as a co-executor in the programs of the Presidium of the Russian Academy of Sciences.
Area of expertise	Nanopowders of metals and their oxides, colloidal solutions
Practical experience in the field of the program under evaluation	The implementation of research work in chemistry and materials science.