

Approved by

Chairman of the Advisory Council

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REPORT
on the results of an external evaluation of the educational program
«Chemistry»
In the field of study 04.03.01 «Chemistry»
Federal State Budgetary Educational Institution of Higher Education
"St. Petersburg State University"

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SUMMARY OF THE PROGRAM

The educational program "*Chemistry*" as part of the educational field of study 04.03.01 "*Chemistry*" is implemented in Institute of Chemistry of St. Petersburg State University and leads to the award of the Bachelor Degree. The program is managed by the Director of the Institute of Chemistry of St. Petersburg State University, Doctor of Chemistry Irina Anatolyevna Balova and the head of the educational program, candidate of chemical sciences, associate professor of the Department of Organic Chemistry Sorokoumov Viktor Nikolaevich.

An in-person 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

- *The presence of the own educational standard of higher education at St. Petersburg State University.*

Objectives: The University (hereinafter also referred to as the HEI), having the right to form its own educational standard established by the Law on Education in the Russian Federation, has developed and approved a document in which the fundamental principles of organizing educational activities are: integration, interdisciplinarity, systematicity, ethics and openness. In the educational process, built in training programs in chemistry at the Institute of Chemistry, all these principles are observed.

The idea of training on individual learning paths laid down in the curriculum allows students to choose a narrower professional focus within the educational program of "*Chemistry*".

In turn, such an organization of the educational process and the preparation of the curriculum demand from students to have a clear understanding of the further development of their professional career, an understanding of the subject area of chemistry they want to specialize in, and accordingly, deepen knowledge and ideas about which companies and what positions they will work in.

- *The goals and strategy of the program are aimed for the formation and implementation of the established competency model, as well as for expanding the possible circle of employers.*

Objectives: The presence of a competency model of the graduate formed in accordance with the current professional standards allows HEI to produce specialists with clearly defined knowledge, skills and abilities that are in demand on the labor market. The program strategy in the educational program of "*Chemistry*" involves unique lecture and practical courses for solving scientific and industrial problems in various aspects of chemistry (analytical, organic, pharmaceutical), training in modern equipment, the choice of an individual learning path for bachelors with a deeper knowledge in a narrower field of chemistry. It provides internships in foreign universities as part of academic mobility for both: students and teachers. The program provides a wide selection of disciplines, original courses with the participation of employers - companies seeking for the development of this area and a wider selection of specialties in field of study of Chemistry. The graduate will be able to work as a

specialist in technical quality control of products, a specialist in research and experimental development, an operator of analytical equipment, a teacher in secondary education programs, and a sales manager in the chemical industry.

- *Highly qualified academic staff*

Objectives: Highly qualified academic staff of the Institute of Chemistry of St. Petersburg State University carry on and appreciate the historical traditions laid down by such great scientists as D.I. Mendeleev, V.I. Vernadsky. (International conference for young scientists in chemistry “Mendeleev 2019”, Russian Chemical Society named after D.I. Mendeleev, “Chemical dictation”, held at the Mendeleev Center).

Scientific publications in rating journals of the largest international and Russian publishers confirm (demonstrate) the high scientific level of academic staff and academic degree personnel's rate. Many teachers have received awards for achievements in the field of chemistry.

Due to the activeness and interest of highly qualified academic staff, the scientific schools created by them allow students to “open up”, involving them in the early courses in scientific topics, form in addition to professional competencies personal and communicative ones that are also necessary for a chemist specialist.

- *Successfully implemented quality management system.*

Objectives: The presence of an existing policy in the field of ensuring the quality of education at St. Petersburg State University, the availability of the Instruction Commission (composed of representatives of employing organizations and students), the presence of the Council of Study Programs, whose responsibilities include labor market demands monitoring and developing proposals for updating educational programs, as well as the holding termly the activities to improve teaching documentation provides a high level of education and its quality assurance.

The Commission for the quality assurance of the educational process (consisting of the academic staff of St. Petersburg State University of various departments) carries out auditing activities with the subsequent submission of an audit report at a meeting of the Instruction Commission and also ensures the maintenance of an appropriate quality level of education and quality assurance of education inside the Institute of Chemistry of St. Petersburg State University.

- *Research activities carried out in accordance with the real needs of enterprises.*

Objectives: A wide range of modern analytical and testing facilities in the Science Park of St. Petersburg State University, which has practically no analogues nationwide, allows to do research of diverse complexity and orientation, which provide with a wide field for the research activities of students and university employees.

It is especially important that students have access to equipment: students have a competitive advantage, as at the end of the education they have operating skills on complex analytical facilities.

Training on modern scientific facilities allows to solve a wide range of industrial problems. The implementation of the results obtained in the course of research work stimulates the student's research interest. This demonstrates the applicable nature of student research results.

Research work and the theme of graduation thesis is consistent with the manufacturers and reflects the research agenda aimed at urgent requests of enterprises (order No. 2143 of March 15, 2019 on the topics of graduate qualification works, the appointment of reviewers to students, cooperation agreement No. B-685-2019 SPbU with CJSC BIOCAD, information of AMC on the State Employment Service 04.00.00 “Themes of graduate qualification works proposed by employers”).

- *Developed information infrastructure covering all types of HEI activities.*

Objectives: Information resources, including an electronic library, allow to create, edit, view and deliver educational content, as well as provide feedback between member of the Institute of Chemistry of St. Petersburg State University and students. The electronic library encourage to implement the fields of science, allow to keep an eye on current trends in the field of chemistry, use international resources and scientific databases, as well as use modern software products necessary for the implementation of fundamental research in the field of chemistry.

The e-learning courses provides the flexibility of the study process, the possibility of passing courses by students at any convenient time within fixed limits. The gradual digitalization of some educational courses is part of the e-learning system, which defines St. Petersburg State University as a modern rapidly developing educational institution. An electronic document management system in various formes of activities of HEI guarantees fast communication inside HEI in general and within the Institute of Chemistry in particular and allows to do work in a timely and in an efficient way.

- *Student Council Active Position*

Objectives: A meeting with the chairman of the Student Council of the Institute of Chemistry of St. Petersburg State University was held as part of site visit. During this meeting it has been found that the Student Council of the Institute actively involves students in quality assessment of the educational process, in particular the quality of teaching through a student survey.

Weaknesses of the program under evaluation

- *Insufficient number of students*

Objectives: Based on the number of budget places over the past 5 years, the number of students at the Institute of Chemistry of St. Petersburg State University is very small for the resources of HEI available to provide the study process (material and technical resources, number of departments and research groups, classrooms for lectures and practical exercises, etc.). It should also be noted that the current number of students is not consistent with number of highly qualified academic staff of the Institute of Chemistry of St. Petersburg State University. The consequence of the lack of students in comparison with the number of teachers is the presence of a “struggle” between the faculty members for students who are in the process of choosing the supervisor of their graduate qualification works (hereinafter – GQW). This primarily affects on the research work of teaching staff and the results of their publication activity. Another consequence of this difference in the number of academic staff and students is a tendency to reduce highly qualified academic staff and tighten the terms of the employment contract for them. It is necessary to say that the reduction in

teaching staff can lead to a falling of the quality of education at St. Petersburg State University that is undoubtedly a negative consequence.

- *Not enough hours for industrial practice*

Objectives: During an interview with graduates of the Institute of Chemistry of St. Petersburg State University as part of an site visit, it was found that some of the respondents lacked practical training during their professional activities and, as a result, lacked knowledge in the field of “Technology”, namely, a general idea of technological processes and their hardware design at real production sites. Work practice is an integral part in studying the theoretical foundations of chemical technology, which is implemented in the 6th semester of 3rd year of study. It allows students to form an idea of real technological processes taking place at the main nearby production sites.

- *Insufficient quantity of hours for reference visits to specialized enterprises*

It is proposed to broaden the range of industrial enterprises for reference visit, as a result of which students will be able to see with their own eyes the organization of work, hardware design and processes implemented in production. It will allow graduates to make the right choice and get to know potential employer-companies.

- *Material and technical equipment of classrooms.*

Objectives: The Institute of Chemistry has a large classroom fund for organizing the educational process, which requires major repair considering the year built. It is necessary to strengthen the interactive component in the educational process (modern interactive whiteboards, screens, etc.), which will allow to conduct classes at a modern level. Lack of audience illumination significantly affects on the fatigue of students and professors, as well as the quality of digestibility of the material. Most university facilities are not suited for inclusive student learning. The main contingent of students and professors feel uncomfortable in the workplace and in classrooms due to the low temperature in the rooms.

There are significant comments on ensuring safety measures in chemical laboratories (partial lack of technical safety journals, technical safety instructions, chemicals standards, lack of work gowns, gloves, masks, glasses for students; gas, air, water supply standards are violated). Special measures should be taken to ensure security at the entrance and exit to the university building and laboratories, to ensure the availability of attendance journals for laboratory assistants, safety instructing logs for students for every semester, as well as logs of those who are accepted for individual scientific work, as the study process is associated with access to chemicals, some of which are related to precursors.

The main recommendations for the program under evaluation

- *Increase the enrollment of applicants through extrabudgetary funding.*

It is recommended to increase the number of students studying in this educational program by increasing the number of budget places. Despite the fact that the administration of the Institute of Chemistry and St. Petersburg State University have no direct influence on this factor (that is, they cannot determine the number of budget places), it is necessary to carry out activities aimed at increasing the number of extra-budget places.

The cost of commercial learning in the field of study of "Chemistry" allows additional enrollment at the expense of the individual. To enrol students at the expense of employers by the cooperation agreement and partial compensation of tuition fee.

- *Preserve the uniqueness of the program due to elective courses.*

As part of the site visit, a partial communication and information gap was revealed between the administration of St. Petersburg State University and the administration of the Institute of Chemistry. It is clearly appeared in relation to the changes in the educational process that must be approved by the university administration. This phenomenon can be demonstrated by the example of the approval of Order 3773/1 of 04/12/2019 "On establishing requirements for the minimum and maximum number of students for studying disciplines," which states that "The minimum number of students for studying elective and optional disciplines is 10 people" (paragraph 1.2.1. of this order).

This innovation automatically takes away the right to choose elective and optional disciplines for students of the Institute of Chemistry as the average number of students studying one discipline is about 3 persons. It does not correspond to this order. The consequence is increasing number of students studying the discipline by reducing the number of disciplines at choice. This will lead to the loss of exclusivity of learning at St. Petersburg State University, which is today almost individual. A partial solution to this issue is to increase the number of students of the program.

- *To increase the time of access to the Science Park of St. Petersburg State University for research scientists and students.*
- *To increase the number of foreign students in the field of study of "Chemistry".*
- *To involve employers in participating in the program as an industrial partner, for example, to carry out joint research by industry orders.*
- *Improve the illumination and equipment of the classroom fund.*
- *To increase the quantity and improve the quality of conducting work internships, as well as organize the reference visits to industrial enterprises.*

It is recommended to increase the number and quality of work internships for students in the educational process, as well as to increase the number of partners (employer companies) in order to boarder the range of enterprises for reference visits with a further prospect for internships and possible employment of interested students and graduates.

- *Further safety in chemical workshops.*

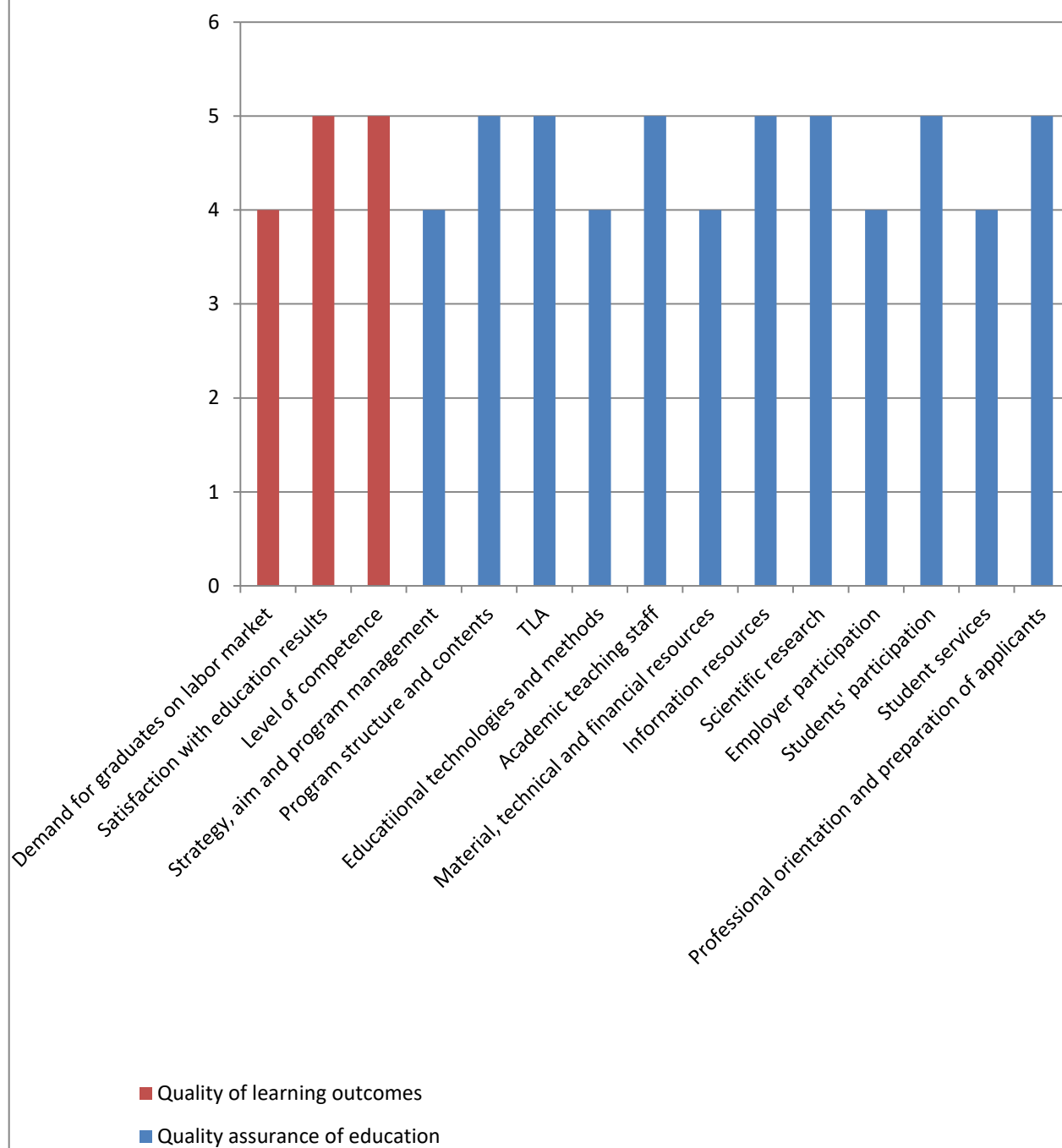
It is recommended to conduct in regular manner inspections for compliance by students and professors with fire safety rules, as well as safety precautions in time of working in laboratories.

- *To optimize the bachelor degree program 04.03.01 "Chemistry" in order to increase the time required to complete graduation thesis.*

Assessment table of learning outcomes and quality assurance of education

No.	Criteria		Assess ment
<i>I</i>	<i>Quality of learning outcomes</i>		
	1.	Demand for graduates of the program on the labor market	4
	2.	Satisfaction with education results	5
	3.	Level of competence development of a graduate	5
<i>II</i>	<i>Quality assurance of education:</i>		
	1.	Strategy, aims and program management	4
	2.	Program structure and contents	5
	3.	Teaching and learning aids (TLA)	5
	4.	Education technologies and methods	4
	5.	Academic teaching staff	5
	6.	Material and technical and financial resources	4
	7.	Information resources	5
	8.	Scientific research	5
	9.	Employer participation in the program implementation	4
	10.	Students' participation in the program contents determination	5
	11.	Student services	4
	12.	Professional orientation and preparation of applicants	5

Assessment table 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

(based on data on the demand for graduates of the last three years presented by the HEI and based on the results of an interview (survey) with graduates)

Analysis of the role and place of the program

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

According to the analysis of statistical data the list of the most popular specialties in 2019 and other years includes technologists of chemical and industrial enterprises. In addition according to Rosbusinessconsulting (RBC) a shortage of specialists with professions in the field of chemistry and petrochemistry, of production of organic compounds and production of inorganic building materials, glass and ceramics are expected in St. Petersburg in the forecast period until 2021. According to HeadHunter.ru website the competition among job applicants in St. Petersburg in the field of science and education is growing compared to 2018.

Graduates of St. Petersburg State University obtain employment in their specialization of study in major companies such as BIOCAD, the Institute of High Molecular Compounds of the Russian Academy of Sciences, Verteks JSC, LLK-International LLC, Active Component JSC, Analit Products LLC, Standart SPC, etc.

The proportion of graduates who were employed in their specialization after graduation is not large (1 person among 8 respondents) that is related to the specifics of requests from the regional and federal labor markets. It should be noted that despite the low percentage of graduates employed after graduation they did not experience problems in the labor market with the choice of a profession in their specialization that was confirmed by an interview with representatives of employers. However, most of employers consider graduates of higher qualifications (master and above) as candidates for the opening: in their opinion bachelors don't have the sufficient degree of qualification. Therefore, the large majority of graduates of the program continue studying at Master's degree programme of St. Petersburg State University or other HEI.

Thus, we can conclude that the bachelor's degree programme 04.03.01 «Chemistry» is fundamental, it gives students the fundamental knowledge and skills in the main fields of chemistry necessary for further deeper study of the chemical disciplines of the second stage of higher education and the choice of the field of chemistry in which the graduate wants to specialize.

It is worth noting: depending on the specifics of the company-employers prefer to engage St. Petersburg State University graduates who have a level of competence development significantly higher than graduates of other universities.

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

St. Petersburg State University is a federal university and fulfills the state task of the government of the Russian Federation. Financing from the budget and the special status of St. Petersburg State University entitles the university to produce specialists for regional enterprises. Moreover, the percentage of graduates employed in the region where the university is located is more than 50%.

The overwhelming majority of bachelor graduates continue their studies in the Master's programme in order to increase the level of demand. According to employers, bachelor graduates are not fully formed professionals who have not had time to determine their field of scientific and professional interests as bachelor's programme provides general, fundamental knowledge in many fields of chemistry. The depth of this knowledge is not sufficient to work in enterprises and companies: it requires higher qualification and deeper knowledge in certain fields of chemistry. In their opinion, the bachelor's programme provides a base that will serve as the foundation for a deeper study of the field of chemical science. The choice of the field of chemistry is supposed in the Master's programme and as a result future graduate masters become mature personalities with their scientific horizons and professional preferences necessary for a competent choice of a place for employment and performance of their duties.

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

In the region there are 4 universities that enrol for the field of study 04.03.01 Chemistry, while the enrollment in St. Petersburg State University is 50 budget places. The enrollment in the field of study of Chemistry is implemented in other universities: St. Petersburg State Technological Institute - 10 budget places; Federal State Budgetary Educational Institution of Higher Education St. Petersburg State Chemical Pharmaceutical Academy of the Ministry of Health of Russia - 10 budget places; Russian State Pedagogical University named after A.I. Herzen - 15 budget places. The proportion of HEI graduates of the main educational program of higher education (hereinafter referred to as MEP) at St. Petersburg State University in relation to the graduates of all other universities in the region in this field of study is 59% (more than half of graduates in this specialization).

Analysis of data submitted by the university (conclusions)

- *The proportion of students who combine study at the university with work in profile is 22%.*
- *The proportion of graduates employed on the field of study obtained as a result of training in the educational program within one year after graduating is 5% (the rest continue their education).*
- *The proportion of graduates employed at the request of enterprises - 0%.*
- *The proportion of students enrolled by order of employers, for example, on the basis of tripartite (target) agreements - 0%.*

- *The share of the contingent of graduates working in the field of training in the region is 100%.*
- *The share of the contingent of graduates working on a training profile outside the region is 0%.*
- *The number of complaints on graduates is 0%.*
- *The number of positive feedback from companies about the work of graduates is 11%. (data of the employment department, % relative to the number of graduates).*
- *The proportion of students of MEP enrolled in the master's programme who completed their bachelor's programmes is 70%.*
- *The proportion of HEI graduates of MEP in relation to the proportion of graduates of all other universities in the region is 59%.*

2. Satisfaction with education results

Criterion grade: Excellent

The meeting with representatives of seven employing organizations was organized as the part of the site visit:

1. LLC "LLK-International" (Representative: Kulakova Vera Mikhailovna);
2. BIOCAD (Representative: Pavel Igorevich Elagin);
3. Active Component JSC (Representative: Denis Nilov Igorevich);
4. VERTEX JSC (Representative: Maxim Evgenievich Borovitev);
5. Institute of High Molecular Compounds RAS (Representative: Skurkis Julia Olegovna);
6. LLC "Analit Products" (Representative: Khripun Anatoly Vladimirovich)
7. SPC "Standart" (Representative: Sedov Alexander Vyacheslavovich)

Based on the analysis of employers' profiles and interviews with representatives of employers, this indicator is rated as "Excellent."

- *The proportion of employers who consider that the competence level of the graduates of the program:*
 - *fully meet demands of modern industry experts - 18%*
 - *basically correspond to modern requirements for specialists in this industry, but there are minor comments - 82%*
 - *few graduates whose level of competence correspond to modern requirements for specialists in this industry - 0%*
 - *do not meet demands for specialists in this industry - 0%*
- *The proportion of graduates satisfied with their learning outcomes - 82%*

During a site visit employers noted that graduates lacked "soft skills".

An insufficient level of knowledge in the field of "Technology" was revealed in the course of interviewing graduates and some professors of the Institute of Chemistry of St. Petersburg State University, namely, a general idea of technological processes and their hardware design at real manufacturing facilities were not formed. It is proposed to provide students with the opportunity to reference visits to enterprises:

students will be able to see with their own eyes the organization of work, hardware design and processes implemented in production. It will allow graduates to make the right choice and get to know potential employer-companies.

3. *Level of competence development of a graduate*

Criterion grade: Excellent

A level of competence development of graduates was checked in the course of the site visit by examination of students' term papers on "Organic Chemistry". 4-year students took part in a direct assessment (there are 4 people, which is 8% of the final course).

During the level of competence assessment of graduates experts used their own questions as control and measurement materials.

In order to analyze the development of competence the expert chose the following one:

- Evaluation of direct assessment of competency that characterize the personality and that are an integral part of his / her professional competency:

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

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

- Evaluation of direct assessment of social competences aimed at the development, maintenance and improvement of communication

UC-3 Able to carry out social interaction and realize their role in the team.

UC-4 Able to carry out business communication in oral and written forms in the state language of the Russian Federation and foreign (s) language (s).

- Evaluation of direct assessment of professional competencies ("competencies nucleus") 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 programme

GPC-4 Able to plan chemical work, process and interpret the results using theoretical knowledge and practical skills to solve mathematical and physical problems.

GPC-6 Able to present the results of its work orally and in writing form in accordance with the rules and regulations adopted in the professional community.

The experts used the following control and measurement materials in the process of evaluation of direct assessment of competency:

I. Examples of questions:

1. How was the experiment planned in the term paper? Personal participation in the preparation of the experiment?
2. How were the results processed? What techniques were used to analyze the results?
3. What is the practical value of this work? Goals, objectives and relevance of the topic.

4. What subjects were used in the practical part of the course work?
5. In what form was the defense of the term paper carried out?
6. How did you search for information in the field of synthesis of substances?
7. What security measures were used during the experiment?
8. Who of the teaching staff or educational support staff did the students contact with in the process of preparing the term paper?
9. What experimental methods were mastered for the first time? What spectral methods were used?
10. Are the results interesting to the professional community? Can the work be presented as the topic of a report at a seminar or conference?

Based on the results of evaluation of a direct assessment of competencies, experts revealed that all the 4-year students surveyed showed a “sufficient level” of knowledge and coped with 80% of the questions asked.

Level Students ratio	Sufficient level (have managed with 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 competency that characterize the personality and that are an integral part of his/her professional competency			
100%	+		
The results of direct assessment of social competences aimed at the development, maintenance and improvement of communication			
100%	+		
The results direct assessment of professional competencies (“competencies nucleus”) 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 programme			
100%	+		

II. Examples of discussion questions:

1. Share professional plans for the next two years.
2. Explain the relevance of the topic and the practical value of the thesis in simple phrase.
3. Describe your professional prospects in 10 years.

Based on the results of evaluation of a direct assessment of competencies, experts found that the most of the 4-year students surveyed showed an “adequate level” of knowledge and coped with 80% of the questions asked.

Level Students ratio	Sufficient level (have managed with 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 competency that characterize the personality and that are an integral part of his/her professional competency			
100%	+		

The results of direct assessment of social competences aimed at the development, maintenance and improvement of communication			
100%		+	
The results direct assessment of professional competencies (“competencies nucleus”) 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 programme			
100%	+		

During the evaluation of quality of education the experts reviewed three graduate qualification works, which topped 6% of the final works of the last year in this field of study. The experts concluded that the graduate qualification work meet all the requirements stated below.

GRADUATE QUALIFICATION WORK

N o.	Objects of evaluation	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 received during the pre-graduation practical training and the preparation of term papers in the independent research units of the GQW.	80%
4.	The topic of GQW is defined by the requests of the production organizations and the tasks of the experimental activity solved by the teachers of HEI.	70%
5.	The results of GQW find practical application in production.	70%
6.	The degree of use of the results of the research of the Chair, faculty and third-party research and production and/or research organizations in the performance of independent research parts of the GQW.	70%

During a student survey experts noted that it was made a little time in the curriculum for the preparation of graduate qualification work and students were engaged in scientific schools throughout the academic year to meet the deadlines for preparation the final examination.

Conclusions and recommendations of experts

Conclusions

The level of the graduation thesis is high and corresponds to the educational program of "Chemistry". All the presented works have an experimental part supported by modern methods of analysis due to the Science Park available at the Institute of Chemistry of St. Petersburg State University and the high qualification of teaching staff.

At present graduates of master's programme are more in demand. Work and pregraduation practice takes place at the University due to the fact that most of the students work on grants of teaching staff. At the same time, the Institute is working with potential employers by adjusting the curriculum, requesting GQW topics, etc.

Recommendations

- To increase in the curriculum the time for completing the bachelor's graduate qualification work.
- To pay attention to the design of GQW based on GOST 7.32-2017.
- To organize work and pregraduation practice at the specialized enterprises of the region.
- To develop soft skills of students by organizing speeches of students on professional topics in front of the general public, which will also help to popularize chemistry.
- To include optional disciplines in the curriculum (for example, Ethics in a Business Environment) for developing business writing skills, for writing curriculum vitae and reviews of scientific work. These skills are currently needed to communicate in the professional field.

QUALITY ASSURANCE OF EDUCATION

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

Criterion grade: Good

The objectives of the bachelor's programme of "Chemistry" are expressed well-defined and harmonized with the professional field. The training program corresponds to the modern level of knowledge in the field of qualification "chemist", and also contributes to the development of social competencies and personality of graduates. Due to intended learning outcomes the program can compete on the national and international educational market.

Programme strengths

- The use of Budapest descriptors provides effective student mobility. Introduction of the EuChemS Code of Conduct has a positive effect on program implementation.

- The understandable internal system of education quality has been built at the university: the opinions of professors and students are taken into account on the issue of organization of the educational process, the quality of classes and the level of student attendance are assessed, scientific research of teaching staff is monitored.

- The responsibility of the Instruction Department and the Council of Educational Program is the annual update, analysis and revision of the program in accordance with the changing conditions of the labor market. The program update mechanism allows to introduce new disciplines declared by the employer, to exclude disciplines unclaimed from their point of view as representatives of employing companies are part of the Instruction Department and the Council of Educational Program.

- There is a partial transition to multilevel training according to educational standards established independently by the public educational institution (own educational standard of St. Petersburg State University) which imposes requirements on educational standards that is no lower than the Federal Educational Standard and also provides the opportunity to form educational programs in accordance with the requests of employers and to take into account the views of students.

- The Education Quality Assurance Commission conducts an annual audit of the evaluation tools and conducts the audit activities in relation of the implementation of EP. The results of these activities of the Education Quality Assurance Commission in the form of recommendations are taken into account while preparing or revising the documentation of study programme of the discipline.

- There is the program of development as a set of performance indicators of subdivisions involved in the implementation of educational program (hereinafter – EP).

Recommendations

- It is recommended to create at the level of implementation of EP “Chemistry” the basic departments of major enterprises of employers, which will realize the scientific potential of students, as well as solve urgent problems of the industry at the scientific base of the Institute of Chemistry. Such interaction will allow employers to select new personnel among students.

- It is recommended to add materials and questions about the goals and objectives of the program in the humanitarian subjects studied in the first courses (for self-examination) in order to increase the proportion of students who are aware of the objectives of the educational program and, for the same purpose, to involve the student organizations. It is recommended to place the objectives of the program in the digital environment of HEI with access to the personal accounts of students and professors.

- To introduce a similar EP in a foreign language to increase the degree of academic mobility of students of the Institute of Chemistry and to involve students from other countries. Despite the fact that within the framework of the educational program at the Institute of Chemistry, English-language trajectories are being formed for foreign students, the creation of a full-fledged educational program in English will involve more foreign applicants which will increase the prestige of St. Petersburg State University in the international educational arena. Probably it will require the development of the concept, strategy and contents of the educational program taking into account international requirements (for example, in accordance with ESG standards, ECTN recommendations). There should not be any problems with the implementation of similar one in an educational program taking into account the high qualification of the teaching staff of the Institute of Chemistry of St. Petersburg State University, in particular, good knowledge of a communication skill in a foreign language.

- The workload should comply with ECTN standards: it is proposed to conduct a student survey to adjust the number of ECTS credits and create a clear separation of the various forms of workload (lectures, laboratory work, consultations, independent work, etc.).

- To include in the appendix to the diploma a table of compliance of Russian assessments with ECTS assessments.

2. Program structure and contents

Criterion grade: Excellent

Programme strengths

- The bachelor degree programme is the starting point in the well-established structure of the "Bachelor's programme - master's programme - postgraduate programme." There are a very wide selection of disciplines and high quality education.

- There is the St. Petersburg State University's own educational standard: bachelor's programme study at the Institute of Chemistry is based on an individual

learning path that allows to take into account the student's choice and wishes regarding the content of the educational process.

- There is the training in competency-based curriculum where each discipline is aimed at development of competence (in whole or in part).
- There is a high level of preparation of graduate qualification works. The program of state final examination contains requirements for GQW and criteria for its assessment formed taking into account the views of representatives of employers and professional communities. Student proposals, opinions of research advisors (holders of grants) and of large employers are taken into account in the formation of GQW topics.
- There are training courses designed with the participation of employers.

Recommendations

- There is non-informative display of the contents of the educational program. Despite the fact that the organization of the educational process is complex and cumbersome it is recommended to develop a form for representing the structure of educational program in which everything will be very clear and understandable, especially to a person who is not a member of St. Petersburg State University. Similar approach will eliminate a large number of clarifying issues and emerging misunderstandings from the various accreditation commissions and inspections that the HEI will undergo in the future. It can also help applicants as well as students arriving by the mobility program to navigate the contents and structure of the program. The profile within the curriculum will highlight the existing learning paths.
- To increase the number of hours in the curriculum for work practice at enterprises in the region.
- Despite the fact that this stage of higher education is aimed at obtaining fundamental knowledge in the field of chemistry by a student this does not exclude the need for reference visits in the form of excursions to chemical industry enterprises. It can help students in choosing the field of chemistry in which they want to specialize.

Additional material

During a site visit experts held meetings with students of the program under evaluation. The correspondence of the structure and contents of the program to the expectations of the direct consumers of the programs (students) is one of the issues discussed. Based on the results of the meetings experts conclude that it is necessary to increase the practical training on analytical and testing equipment.

In a survey of representatives of employers-companies it was noted that graduates lacked the skills to work on analytical equipment, in particular, the skills to work with instrumental methods of analysis.

3. *Teaching and learning aids (TLA)*

Criterion grade: Excellent

Programme strengths

- An integrated approach to the approval of teaching materials (hereinafter - TM) provides the correct program contents and guarantee the implementation of all stages and aspects of the program.
- There is the possibility to develop syllabus by students and employers. This right allows to form the contents of EP corresponding to today's demands of the labor market, to form professional competencies required upon entry into employment by employers. The development of syllabus by students increases the involvement of students in the educational process. The opportunity to participate in the formation and planning of educational activities confirms the importance of students in the preparation of the educational program, makes them understand that their opinion is significant in the development of the syllabi of the course.

Recommendations

- To work out syllabus forms in more detail, especially the paragraph 1.3 “List of learning outcomes”. In addition to the declared competencies that students must develop while studying the course, it is worth to indicate separately and clearly what about they should have the knowlege, what they should know and what the student should be able to do at the end of their studies in this course. It contributes to:

- timely identification of deficiencies in the organization of lecture and practical classes and their effective elimination;
- the development of teaching materials for the ongoing monitoring of progress checking the level of formed competencies assigned in the syllabus, identifying and resolving problems associated with the assimilation of material by students.

Recently, syllabus are actively used by professors and by students. In particular, the Student Council of the Institute of Chemistry is actively involving students in the study and use of syllabus. Therefore, a clear and standardized form of the syllabus will allow both professors and students to use more effectively this document, to search the information they need. For example, you should develop a type of syllabus in a fillable form that will be common to all courses.

- To include optional courses in the curriculum (for example, “Ethics in the business environment”) for the development of public speaking skills, business writing, writing CV and reviews of scientific thesis. These skills are currently needed to develop communication skills in the professional field.

- To prepare TM (lectures, teaching aids) for conducting classes in English, which will give an influx of foreign students including students from European universities as part of academic mobility.

4. Educational technologies and methods

Criterion grade: Good

Programme strengths

- There is the use of digital educational information environment: the use of e-learning, distance and modern digital educational technologies, including online courses which is part of the e-learning system, present St. Petersburg State University as a modern, constantly developing educational institution (for example, the Blackboard educational process support system).

Execution of graduation qualification work with extra-budgetary funding demonstrates the relevance of GQW. GQW is implemented in the form of a case-method: it makes possible to form several competencies at once (for example, UC-2 "Able to determine the range of tasks within the framework of the set goal and choose the best ways to solve them, based on existing legal norms, available resources and restrictions"; PCP-1 "Able to carry out research in the field of chemical sciences requiring broad fundamental interdisciplinary training and skills of modern experimental methods at the level of the executor") and it also involves the independent acquisition of knowledge in the process of solving practical problems or problems requiring the integration of knowledge from different subject areas (this refers to the formation of competency PCA-2 "Able to self-study and change the profile of scientific and scientific industrial activity").

- Institute of Chemistry conduct workshops involving representatives of employers and present major industrial enterprises especially before starting training. Such events, carried out on a regular basis, increase the level of students' interest in learning, helps to overcome the "isolation" of the labor market from the educational sector. Such events give students a guarantee of the demand for their knowledge, skills and abilities at the end of their studies in the HEI, thereby the aim is to eliminate the problems associated with job searching by young people.

Recommendations

- To increase the number of training courses (modules) implemented with platforms and e-learning tools (online courses).

- To develop universal forms for examination procedures.

- To refine the methods of conducting lectures by applying problematic and situational teaching methods.

- To use practical sessions in training courses for development of students' professional skills and for more rapid reaction in making decisions.

- To check students for compliance with fire safety rules and safety regulations during working in the laboratory on a regular basis. A safety log must be maintained in each laboratory.

- To provide students of the Institute of Chemistry with personal protective equipment (hereinafter - PPE) during laboratory work as well as during the execution of GQW and control over the use of PPE.

- To increase safety monitoring in chemical workshops. It is recommended to conduct on a regular basis checks for compliance by students and teachers with fire safety rules as well as safety precautions during working in laboratories.

- To develop and implement internal documentation for the regulation and validation of laboratory work according to existing rules and requirements (maintaining of a safety log, maintaining of a laboratory log that notes the time when students and members of the scientific group visit the laboratory, the equipment operation log which marks the work on this equipment (persons working in the laboratory and working hours) as well as a mark on the occurrence and elimination of the malfunction and breakages).

Additional material

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

Lecture 1.

Name of teacher: Boyarsky Vadim Pavlovich

Group / Specialty 16.B04-h

1. Discipline / module Theoretical Foundations of Organic Chemistry

2. Type of training session

- Lecture

- ☐ Seminar

- ☐ Laboratory class

- ☐ Practical session

- ☐ Integrated skills lesson

- ☐ Other _____

3. Theme of the lesson: Theory of transition state. Thermodynamic and kinetic control of the composition of reaction products. Classic isotope effect.

4. Purpose of the lesson: to master the principles of applying the theory of transition state to the description of the reactivity of organic compounds.

5. Objectives of the lesson: to familiarize with the basic equation of the theory of the transition state, its limitations, the qualitative and quantitative relationship between the thermodynamic and kinetic parameters of organic reactions (Bell-Evans-Pollani principle, Marcus equation, Hammond's postulate); to describe the concepts of thermodynamic and kinetic control of the composition of reaction products in the framework of the transition state theory, Curtin-Hammett principle. Classic isotope effect, its nature and use of it to diagnose the structure of the transition state and the mechanism of the organic reaction.

6. Material and technical support of the lesson: an audience equipped with a computer, a multimedia projector and a blackboard.

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 description the reactivity of organic compounds in the framework of the theory of transition state	Lecture, presentation
2.	Knowledge of the relationship between thermodynamic and kinetic parameters of organic reactions	Lecture, presentation
3.	Concept of thermodynamic and kinetic control of the composition of reaction products	Lecture, presentation
4.	Knowledge of the nature of Classic isotope effect and its use for diagnosing the structure of the transition state and the mechanism of the organic reaction	Lecture, presentation

THE EVALUATION OF THE PROFESSOR

No	Analysis criteria	Index	Mark (0,1,2)
1.	Compliance with employment 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 evolving competences).	2
3.	Motivation of students for the upcoming activities	Indication on formation of the urgent professional and / or social and personal competencies.	2
4.	Classroom climate	The presence of a positive emotional interaction between professor and students; mutual goodwill and audience participation.	2
5.	The quality of presentment	Structured material; clarity of current tasks; consistency and availability of presentation; adaptation of the presentation to the specific of the audience; the examples of relevant facts.	2
6.	Compliance with the content of the course program	To compare with the teaching materials.	2

7.	The use of visual materials	Course book, tutorial, hand-outs, tables, figures, etc.	2
8.	Declamatory skills	Audibility, intelligibility, euphony, literacy, speech tempo; facial expressions, gestures, pantomime; emotional intensity of the performance.	1
9.	Sensitivity to the audience	The ability to react to the changes in the perception of the audience.	2
10.	Correctness in relation to students		2
11.	Methods of attention organization and student behavior regulation	Increased interest among the audience (interesting examples, humour, rhetorical devices, etc.); involvement of the audience into a dialogue, in the process of performing tasks, etc. But it is unacceptable: to call upon the attention of the audience in an open form; to demonstrate disapproval; to use the methods of psychological pressure, or blackmailing.	2
12.	Maintaining the “feedback” with the audience in the course of educational process	Control of learning outcomes.	2
13.	Summing up 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	-
14.	Image	Compliance with the corporate identity, presentable, charisma.	1
15.	Final evaluation		2
16.	Notes and reviewer recommendations:		

Lecture 2.

Name of teacher: Volkova Natalia Aleksandrovna

1. Discipline / module Physicochemistry application of mathematical methods

2. Type of training session

● Lecture

☐ Seminar

☐ Laboratory class

☐ Practical session

☐ Integrated skills lesson

☐ Other _____

3. Theme of the lesson: Goals leading to idea of curvilinear integral.

4. Material and technical support of the lesson: Blackboard

THE EVALUATION OF THE PROFESSOR

No	Analysis criteria	Index	Grade (0,1,2)
1.	Compliance with employment regulations	A timely beginning and ending of the lesson, time-balanced sections.	
2.	Organizational process	Greeting. Communication of the topic, objective (the connection of the objectives to the evolving competences).	
3.	Motivation of students for the upcoming activities	Indication on formation of the urgent professional and / or social and personal competencies.	2
4.	Classroom climate	The presence of a positive emotional interaction between professor and students; mutual goodwill and audience participation.	2
5.	The quality of presentment	Structured material; clarity of current tasks; consistency and availability of presentation; adaptation of the presentation to the specific of the audience; the examples of relevant facts.	2
6.	Compliance with the content of the course program	To compare with the teaching materials.	
7.	The use of visual materials	Course book, tutorial, hand-outs, tables, figures, etc.	2
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.	Correctness in relation to students		2
11.	Methods of attention organization and student behavior regulation	Increased interest among the audience (interesting examples, humour, rhetorical devices, etc.); involvement of the audience into a dialogue, in the process of performing tasks, etc. But it is unacceptable: to call upon the attention of the audience in an open form; to demonstrate disapproval; to use the methods of psychological pressure, or blackmailing.	2
12.	Maintaining the “feedback” with the audience in the course of educational process	Control of learning outcomes.	2

13.	Summing up 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	
14.	Image	Compliance with the corporate identity, presentable, charisma.	
15.	Final evaluation		2
16.	Notes and reviewer recommendations: The board is quite small and at the same time is divided into parts: the teacher has to move constantly from one side to another, which is a distraction for students while assimilating the material. Moreover, it is quite difficult to disassemble what is written on the board from the rear desks. It is recommended to use more modern tools in the learning process (films, projectors, visual representation of chemical formulas, providing handouts, etc.).		

In the process of analyzing the self-examination report, analyzing the curriculum and class schedule, the experts determined that the proportion of conducting classes in an interactive form as a whole in the program is 30%.

5. Academic teaching staff

Criterion grade: Excellent

Programme strengths

- There is the competitive selection for the posts of academic staff with clearly defined requirements for candidates (Order of July 18, 2017). This item forms the creation of a competitive academic environment, provides stimulation for improving the level of qualifications of candidates.
- There is highly qualified teaching staff. All professors are PhD or doctor of science.
- The number of highly qualified teaching staff is higher than in leading European universities.
- There is regular advanced training courses (hereinafter - ATC) of teaching staff in the form of courses, webinars, ensuring the constant updating of their knowledge.
- The effective contract concluded with the member of the teaching staff has such indicators as the mandatory conduct of research work in the field related to the department specialization, participation in the writing and publication of articles on the subject of their scientific activities. The introduction of these requirements into the labor contract stimulates the employee to conduct research activities, to work in practical projects with groups of students and graduates, to participate in competitions in order to support their own research projects.
- There is the recruitment:
 1. by conducting an audit and determining the specialists needed for the development of education and science,

2. by searching and invitation of specialists needed for the development of the university, by refreshing staff, by optimizing educational and scientific activities.

- The members of other Russian and foreign scientific, educational and research and production institutions can participate in research competitions held by HEI. It is one of the types of recruitment and cooperation within the country and abroad.

- The performance indicators of teaching staff allows to evaluate teaching staff activity, identify the reasons leading to a decrease in efficiency, eliminate the causes and build further work with members of teaching staff.

- There is an interaction with potential candidates for work in HEI (personnel' training among the most prospective students, development and support of administrative and managerial staff).

- There are surveys and questionnaires of students of HEI conducting to assess the work of teachers and the quality of subjects. The quality of subjects is considered as a component of the premium part of the teacher's salary.

Recommendations

- To carry out certification procedures for professors for compliance with professional industry standards and qualifications frameworks. This factor is important for the effective and correct work of teaching staff, it supports and guarantees the high qualifications of its members. This can be done through the international certification and qualification center (<https://www.iqacc.org/certification>).

- To increase the base part of the salary under an employment contract concluded with the members of the teaching staff. The work of a professor at the Institute of Chemistry requires extensive scientific and academic activity, which is prescribed in the employment contract. In the course of interviewing the teachers it was revealed that not everyone is able to maintain both of these aspects at the highest level: someone is good at presenting material to students, some of the teachers are “revealed” while working in a research group as a advisor. This issue must be taken into account and it is advised not to prejudice teachers materially as they have a large volume of class hours, including in the position of assistant or senior teacher.

- It is recommended to organize courses or trainings for professors to improve public speaking skills and speaking skills in public. Despite the high qualification of teaching staff in general it was noted that not all teachers conducting lectures have a high level of speaking skills in public, as well as the skill of presenting material in a form accessible to a student with any level of preparation.

- To involve postgraduate students in the educational process in order to use their “fresh eye” at the use of audio-visual tools or other modern methods in the learning process.

6. *Material and technical and financial resources of the program*

Criterion grade: Good

Programme strengths

- There is a modern equipment for fundamental and application scientific research (Resource Center of the Science Park at St. Petersburg State University).
- There are a lot of technical resources of the program allowing to introduce e-learning into the educational process of the program as well as to improve the mechanisms of its use (Blackboard system which allows students to take some disciplines in the form of online courses).
- There is completeness of library funds providing the educational process with a sufficient amount of basic and additional educational material as well as scientific periodicals (Scientific Library named after M. Gorky).
- There is an additional funding of the program coming from contracts with students on a contractual basis. There are grants' research as well as research concluded under an agreement with employing companies as part of the graduate qualification work.

Recommendations

- To ensure accessibility of education for people with limited health capacities or with some individual psychophysical characteristics. For example, it is recommended to provide the building with ramps, wheelchairs and a schedule for the visually impaired, so that health features do not impede class attendance. The bulk architecture has a large number of stairs, herewith there are no ramps and at the time of the visit the elevators worked partially. To move inside the bulk you need to go around the half-bulk and you can't do it without going up or down stairs. All these factors are a serious obstacle in case of unforeseen health problems. The web-site must have a version for people with low vision.
- The peculiarity of this program is the extension of a medical certificate for working with harmful and active substances. Taking into account the large number of hours of laboratory classes it initially assumes that only healthy people can undergo training. Unfortunately, today university members do not look strictly at this certificate after HEI entrance, they do not even ask it at the Admission Committee. It is recommended during the enrollment to treat with serious the medical psychophysical features of applicants based on medical certificate and take them into account in training. It will ensure comfortable student learning conditions at the university.
- To organize a medical office in a chemical building to provide an opportunity to patch up at the Institute of Chemistry. For example, during training students may get temporary health problems (limb injury, sprains or fractures in sports, a chemical burn in the laboratory while working with reagents).
- To increase the number of specialized licensed software used by students and members of the Institute of Chemistry in the course of carrying out research work.

A shortage of specialized licensed software was revealed during the interrogation of students and teaching staff of the Institute of Chemistry.

- To improve the condition of the classroom fund of the Institute of Chemistry. During the site visit it was discovered the following: a significant part of the lecture halls needs cosmetic repairs, some classrooms lack a good lighting which affects on the assimilation of knowledge and the working capacity of both students and teachers, taking into account the geographical features of the region.

- To continue equipment upgrades in training laboratories. To check the system for supplying gas and air to laboratories and color the pipes in accordance with GOST (yellow-gas, blue-air).

- To increase the operating time of the Resource Center of the Science Park of St. Petersburg State University to 20:00, which will allow more students to engage in scientific research after the main study process.

- To create comfortable conditions in the classrooms by raising the temperature. During the site visit the main contingent of students and professors noted that they feel uncomfortable in the workplace and in the classrooms due to the low temperature in the rooms.

Additional material

During the site visit the experts interviewed students and professors participating in the implementation of the program for satisfaction with the quality of the classroom fund. The results of interview allow experts to conclude about the need of cosmetic repair in the building of the Institute of Chemistry and major repair on individual floors. At the same time the incomplete occupancy of the Institute of Chemistry building will not create problems in the educational process during repairs.

7. Information resources

Criterion grade: Excellent

Programme strengths

- There is a good information infrastructure designed to create, store and work with educational content (Blackboard Distance Learning System, Shooting of online courses at St. Petersburg State University, Science Park application system, St. Petersburg State University repository, St. Petersburg State University library digital resources).

- There are specialized databases and e-libraries in which you can search for scientific information (Reaxys, Web of Science, Sci Finder).

- There are paid online subscriptions to leading scientific publications (Scopus, Wiley, Elsevier, etc.).

Recommendations

- To ensure a free access to the wi-fi network without additional registration in the HEI environment.

- To provide an e-schedule in the halls of the Institute of Chemistry with free access.

8. Scientific research

Criteria grade:

Programme strengths

- Conducting research activities is an integral part of the HEI activity since in the course of research the students form competencies defined in accordance with the educational program (for example, PCP-1 “conduct research work in the field of chemical sciences that require broad fundamental interdisciplinary training and knowledge skills of modern experimental methods at the performer level”).
- Conducting active research at the world level.
- Conducting research at the expense of internal and external financing (Russian Foundation for Basic Research, Russian Science Foundation).
- Interdisciplinarity of research, publication of research results in leading scientific journals (indexed by Web of Science Core Collection or Scopus).
- Involving students in research activities by including them in work on grants, writing articles for publications in scientific indexed journals, and participating in Russian and international conferences. It helps to increase students rating in the competition for increased academic scholarships as well as in the competition for participation in the student academic mobility program.
- The presence of a huge instrument base for research of various fields of study (Science Park St. Petersburg State University).

Recommendations

- To increase the working time of the Science Park of St. Petersburg State University for conducting scientific research at the request of students and teaching staff since in the daytime they are involved in the educational process.

Additional material

Information on the results of monitoring the opinions of students according to the criterion “The influence of research on the quality of education” was presented in documents on self-evaluation of HEI. Experts emphasized the attitude of students to the further choice of their labor activity. Most of the surveyed students want to connect their lives with scientific work. Such factors as the high level of professionalism of the teaching staff, the degree of student involvement in scientific projects and the level of the technical equipment clearly contribute to it.

9. *Employer participation in the program implementation*

Criteria grade: Good

Programme strengths

- An important factor in the quality of education at St. Petersburg State University is the organization of systemic interaction with employers: as part of educational-methodical commissions; as part of state examination commissions (composition - 100% of employers); participation in the examination of educational programs of St. Petersburg State University; participation in the formation of topics of scientific research, topics of course and final qualification works of students; involved as independent external reviewers to assess the level of work and prepare feedback on QW.

According to the results of the QS Graduate Employability Rankings rating in terms of the indicator reflecting the participation of employers in the university life St. Petersburg State University became the best in Russia (<https://spbu.ru/news-events/novosti/orientirovany-v-budushchee-rabotodateli-i-vypuskniki-pomogayut-spbgu-sozdavat>).

Recommendations

- A low indicator of the number of workshops conducted by representatives of employers in the total volume of training activity (15%) allows recommending the involvement of more interested persons from the professional community.
- To plan the reference visits to relevant enterprises during the academic year in order to popularize professional aspects among students of bachelor's programme.
- To discuss with employers the possibility of raise additional funding for the Institute of Chemistry taking into account that the Institute of Chemistry is a supplier of highly qualified personnel.

Additional material

The self-evaluation report provides information on the results of a survey of employers regarding their satisfaction with the quality of graduate learning outcomes. Questionnaire results are presented in Appendix 19 "Analytical information and questionnaire results": 82% of employers believe that the competencies of graduates mainly correspond to modern requirements for industry experts. The analysis noted: 82% of employers believe that the competencies of graduates mainly correspond to modern requirements for industry specialists. The questionnaires clearly show the high interest of employers in Master Degree students who has a conscious approach and a high level of knowledge of modern analysis methods.

10. Students' participation in the program contents determination

Criteria grade: Excellent

Programme strengths

Students take an active part in the process of determining the content of the program, as well as in assessing the quality of the educational process:

- All changes in EP (the introduction of new disciplines, changes in the syllabi, etc.) are considered at meetings of the Instruction Commission, which includes representatives of employers and representatives of the Student Council, as well as at meetings of the Council of the educational program, which consists of employers. This approach allows shaping the educational environment and the educational process taking into account the wishes of employers as representatives of the modern labor market and students as the main participants in the educational process.
- As part of its activities, the Student Council sends its representatives to participate in the work of the Academic Councils of faculties and the Academic Council of St. Petersburg State University, Instruction Commissions, Commissions for acceptance of documents for transfers and reinstatement, Scholarship commissions, Temporary commissions for the acceptance of work performed and services rendered, Temporary commissions for distribution of vouchers to recreation facilities and to the Sanatorium-dispensary of St. Petersburg State University.
- The Student Council's vigorous activity with regard to assessing the quality of education and the activities of teaching staff at the Institute of Chemistry through various surveys and inclusion in the audit commissions to assess the quality of education of their representatives.
- The curriculum and syllabi are updated annually. The actualization of the syllabi is carried out, among other things, based on the recommendations of the Commission for the quality assurance of the educational process of the Institute of Chemistry, which includes students.
- As part of the assessment of the quality of education, the Student Council of the Institute of Chemistry organizes a survey which is conducted at the beginning of the examination period before the start of the new semester. Then the Student Council processes the received data and publishes them on information boards and in the official group on the VKontakte network. Based on the results of the assessment of the quality of education there are several measures as conversation with the lecturer on the conflict situation, recommendations on changing the educational and methodical documentation, or changing the lecturer.

Recommendations

- To provide students with the opportunity to assess the workload of the educational program and change its normative student workload.

11. Student services on a programme level

Criteria grade: Excellent

Programme strengths

- The organization of various job fairs by the Student Council to involve new employers in cooperation and ensure the employment of future graduates, as well as the organization of internships.
- Organization of Summer Schools, within the framework of which students can create their projects and startups and nominate them for the competition of student projects "St. Petersburg State University Start-Up" (https://fund.spbu.ru/Startup_spbggu.html). It is worth noting that not only students of the Institute of Chemistry but also students of other faculties and institutes of St. Petersburg State University take part in Summer Schools. This strengthens inter-faculty communication of students. Participation in the Summer School also builds students' teamwork skills, communication skills with their colleagues and brings in some business communication elements that are necessary for the successful presentation of their projects.
- The presence of a wide range of extracurricular activities at the university level which allow to take into account the individual characteristics and inclinations of students, including contributing to the process of socialization and adaptation of students from socially vulnerable segments of the population. Information about such events is available on the St. Petersburg State University portal (<http://www.students.spbu.ru>). The Student Council forces students to be informed of various mass extracurricular activities at the level of the Institute of Chemistry (for example, initiation into students, which is held for freshmen at the beginning of each academic year).
- Providing students with free trips and trips with partial compensation to the Horizon sanatorium (<http://students.spbu.ru/mmen-otdyh-dlja-studentov.html>) (Krasnodar Territory, vil. Tuapse, Olginka) on a competitive basis. During an interview students said that they had no difficulty getting vouchers for the sanatorium.
- There are more than 15 creative clubs and studios at St. Petersburg State University which provide extracurricular activities for students (Career Club, English Club, St. Petersburg State University Theater Studio, Volleyball Sports Club, St. Petersburg State University Rugby Club, Martial Arts Club (Judo, Sambo, Boxing) and etc.).
- St. Petersburg State University student volunteer organizations conduct community cleanups and environmental campaigns, visits to orphan homes and assist in organizing various events at the University. There is a search student unit "Ingria" at St. Petersburg State University which conducts several "memory watches" and visits to battlefields during the Great Patriotic War of 1941-1945 in the Leningrad Region during the academic year. Ski trips, excursions and exhibitions for students are organized. The University regularly hosts donor days.

Recommendations

- To provide socio-psychological support for students studying in the educational building of the Institute of Chemistry (in Peterhof).
- Lack of conditions for students with disabilities or students with chronic illnesses (for example, voice recognition software, hearing aids or lecture notes, lifts).

12. Professional orientation and preparation of applicants

Criteria grade: Excellent

Programme strengths

An active pre-profile preparation of applicants is being conducted at the Institute of Chemistry. It provides to get a high score without additional entrance exams.

It is important to note that St. Petersburg State University has a structural subdivision - scientific training center of federal subordination "Academic Gymnasium named after D.K. Fadeeva ", which implements specialized basic and additional educational programs of basic general and secondary (complete) general education. The boarding school is part of the gymnasium which allows to accept students from other regions into the gymnasium. University Professors teach at the gymnasium.

The Institute of Chemistry has developed a whole range of preparation activities:

- The Olympiad of schoolchildren of St. Petersburg State University in Chemistry has 23 years of experience. It is included in the Russian list of school Olympiads and has the 1st level. Training materials for the analysis of the Olympiad problems of St. Petersburg State University are published annually, they are available in e-form for free (<https://olympiada.spbu.ru/index.php/olimpiada-shkolnikov/zadaniya-olimpiady>).
- There is the children's holiday "Journey into the world of chemistry" where primary school students and preschoolers meet the basic laws of chemistry and chemical transformations in a playful way and in a presentation form.
- The Russian scientific-practical conference of schoolchildren in chemistry (annually).
- The international chemical tournament for schoolchildren from various cities of Russia, as well as near and far abroad
- Online presentations of the educational program, answers to questions from applicants (available on the university website).

It should be noted that these events cover all groups of schoolchildren and preschoolers, potential applicants.

Recommendations

Participation in the Gazprom schoolchildren's industry Olympiad in five subjects: chemistry, physics, mathematics, economics and computer science will involve an additional audience of schoolchildren including improvement of the cooperation of employers with HEI. It allows to involve strong motivated students to study at the expense of targeted agreements with PJSC Gazprom. For example, St. Petersburg State University can become a participant in the Olympiad by acting as a location for a face-to-face tour. St. Petersburg State University can award an additional point (s) for applicants who become winners or prize-winners of the Gazprom Olympiad. Such participation will catch the interest of applicants and of employers.

Additional material

After interviews with students experts noted the high motivation of applicants from different regions of the Russian Federation about the prospects of admission and training at St. Petersburg State University. Reviewers also noted their understanding of the upcoming educational process, the desire to engage in serious science from school and to continue scientific research studying in HEI. Many students are motivated to continue their studies in the Master degree programme and Postgraduate programme.

REVIEWER'S CVs

Name of expert: Stokolos Olga Anatolyevna

Place of work, position	Associate Professor, Department of Organic Chemistry and Petroleum Chemistry, Russian State University of Oil and Gas (NRU) named after I.M. Gubkin
Academic rank and degree	Ph.D., Associate Professor
Honored titles, degrees	
Education	Higher education
Professional achievements	Certificate "International Lecturer of Technical University" of the International Society for Engineering Education IGIP
Area of expertise	<p>Petrochemistry, organic chemistry, oil chemistry.</p> <p>Research methods for the separation of petroleum acids from petroleum and petroleum products.</p>
Practical experience in the field of the program under examination	<p>20 years of teaching at the University of Oil and Gas. Conducts lectures and practical classes for students of the relevant faculty and other technical faculties in the following disciplines:</p> <p>Organic chemistry, Petroleum chemistry, Concepts of modern science, Additional chapters of chemistry.</p> <p>Organization and participation in the projects "Engineering Class", "University Saturdays", the social project "Smart Moscow". Participation in continuing education for oil and gas industry workers (lecturing).</p> <p>Five years of work as deputy head of the department on science. For 10 years, administrative work in the dean's office of the faculty of chemical technology and ecology.</p> <p>48 publications in Russian and foreign editions.</p> <p>Preparation of methodological and educational manuals on organic chemistry for students of chemical and technical specialties.</p> <p>Participation as an international expert in Kazakhstan in the Independent Agency for Accreditation and Rating.</p>

Name of expert: Aleksanyan David Robertovich

Place of work, position	TANECO JSC, engineer-technologist of the Department of Chief technologist
Academic rank and degree	PhD in Chemistry
Honored titles, degrees	
Education	Higher, PhD.
Professional achievements	A total of 7 articles and 27 theses in Russian and foreign publications, in the RSCI (4 articles) and Scopus (3 articles). Winner of the All-Russian contest "New Idea 2018" IPK TEK under the auspices of the Ministry of Energy.
Area of expertise	Organic chemistry, petrochemistry, oil refining
Practical experience in the field of the program under examination	He was engaged in the synthesis of 2-aryl (hetaryl) -4-hydroxyindoles based on 1-substituted 3,5-dinitrobenzenes with antiviral and antifungal properties. The compounds are analogues of the drug "Arbidol". He was engaged in the search for ways of chemical utilization of analogues of trinitrotoluene and trinitrobenzene.

Name of expert: Ivanova Maria Petrovna

Place of work, position	Student of Russian State Pedagogical University named after A.I. Herzen.
Academic rank and degree	-
Honored titles, degrees	-
Education	Russian State Pedagogical University named after A. I. Herzen (Department of Chemistry)
Professional achievements	<ul style="list-style-type: none"> • Participation in a student conference with international participation "Chemistry and Chemical Education of the XXI Century" in 2019; • Participation in the Tournament of Three Sciences in 2018 and 2019 as a team captain from the Russian State Pedagogical University named after A.I. Herzen. • She is a winner of the regional chemistry Olympiad among higher educational institutions of St. Petersburg in 2018 and 2019 (II and III places, respectively).
Area of expertise	<i>Organic chemistry:</i> chemistry of nitro compounds, chemistry of nitrogen-containing compounds, chemistry of indole and its derivatives, chemistry of isatin, chemistry of mono- and polycarbonyl compounds;

	<i>Physicochemical methods for identifying and establishing the structure of organic compounds: NMR spectroscopy, IR spectroscopy.</i>
Practical experience in the field of the program under examination	She studied undergraduate program 04.03.01 Chemistry. At the moment, he is studying under the master's program 04.04.01. Chemistry

Name of expert: Rainer Salzer

Place of work, position	Ex-chairman of the ECTN Label Committee for the Chemistry Eurolabel® for quality education, ex-professor of Analytical Chemistry at the Technische Universität Dresden, Germany
Academic rank and degree	Doctor, Professor
Honored titles, degrees	Member of the Norwegian Academy of Sciences
Professional achievements	Professor Salzer has authored 22 patents in different fields of analytical chemistry as well as 300 books and scientific publications. Professor Salzer has been elected on to a variety of national and international boards. He is a member of the Norwegian Academy of Science, a recipient of several national and international medals. He served as President of the Division Analytical Chemistry of the German Chemical Society and as National Delegate to the Division of Analytical Chemistry of EuChemS, where he was Head of the Study Group Education.
Area of expertise	Molecular monitoring for early diagnosis of diseases and quality standards in university education.