FEDERAL STATE AUTONOMOUS INSTITUTION OF HIGHER EDUCATION NATIONAL RESEARCH TOMSK STATE UNIVERSITY

FACULTY OF CHEMISTRY
STRATEGIC ACADEMIC UNIT (STRAU)
INSTITUTE SMART MATERIALS AND TECHNOLOGIES

APPROVED BY

Rector

_____E.V. Galazhinskiy
(signature)

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REPORT

ON SELF-ASSESSNENT OF THE CLUSTER OF STUDY PROGRAMMES IN SUBJECT AREAS 04.03.01, 04.04.01 CHEMISTRY, SPECIALISATION 04.05.01 FUNDAMENTAL AND APPLIED CHEMISTRY

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Tomsk – 2019

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INTRODUCTION

Modernisation of the national education system is associated with growing importance of the quality of specialist training. The assessment report aims to reveal compliance of the cluster of study programmes in Tomsk State University – Chemistry (04.03.01, Chemistry); Fundamental and Applied Chemistry (04.05.01, Fundamental and Applied Chemistry); Fundamental and Applied Chemistry of Substances and Materials (04.04.01, Chemistry); Translational Chemical and Biomedical Technologies (04.04.01, Chemistry) – with The Standards and Guidelines for Quality Assurance in the European Higher Education Area (ESG) in the following areas:

- policy for quality assurance;
- design and approval of programmes;
- student admission, progression, recognition and certification;
- teaching staff competence;
- sufficiency and accessibility of learning resources and student support;
- information management;
- public information about quality of education;
- internal and external monitoring of programmes.

Self-assessment is an integral preliminary stage of external assessment of the study programme. Self-assessment establishes compliance of the quality of training of graduates of the study programmes with standards and criteria of international vocational and public accreditation of the National Centre for Public Accreditation agreed with the Higher Education Expo China of the Ministry of Education of the People's Republic of China (HEEC).

Self-assessment enabled analysis of the content, level, and quality of training, content of the programmes and conditions for their implementation, revealed strengths and weaknesses of educational activity, estimated the dynamics of the development of the programmes, learning resources, compliance of the training with Federal State Educational Standards/Independently Established Educational Standards/Professional Standards.

I GENERAL PROVISIONS

In 1878, Emperor Alexander II signed a decree on the establishment of the first university in Siberia. Opening of Medicine and Law Faculties in 1917 was followed by the opening of the Faculties of Physics and Mathematics and History and Philology.

Nowadays, 14,000 students from 67 countries study at 14 faculties, 6 institutes, and 4 Strategic Academic Units (StrAU). The university carries out 184 study programmes in 2019-2020 (71 – Bachelor's, 10 – Specialist's, 103 – Master's).

Postgraduate students can earn their doctoral degree in 74 subject areas.

In 2006, Tomsk State University became a member of the European University Association (EUA).

The university is participating in the Competitiveness Improvement Programme 5-100 for leading Russian universities.

In 2018, the university was ranked 19 in QS University Rankings: BRICS. It rose in QS World University Rankings taking 268th place in 2019. It is ranked 7th in Interfax: National University Ranking; 49th in THE Emerging Economies Rankings; 5th in Webometrics: Country University Ranking.

The Faculty of Chemistry started its history in 1888. The Department of Medical and General Chemistry at the Faculty of Medicine turned into the Department of Medical Chemistry and Department of General Chemistry in 1893. The Faculty of Physics and Mathematics gave rise to the Departments of Inorganic, Analytical, and Organic Chemistry in 1917 and to the Department of Physical and Colloidal Chemistry in 1927. In 1970, the Department of Chemistry of Macromolecular Compounds and Petrochemistry appeared along with the Institute of Petroleum Chemistry of the Siberian Branch of the Russian Academy of Sciences (SB RAS). In 1932, The People's Commissariat for Education signed a decree and transformed the Chemistry Department into the Faculty of Chemistry.

Currently, the Faculty comprises 5 certifying departments, 15 research laboratories, 6 scientific and educational centres, and 2 centres for collective use of physical and chemical equipment. 2 RAS academicians, 20 Doctors and 59 Candidates of Sciences are involved in research and teach and prepare undergraduate and postgraduate students in subject area Chemistry, specialisation Fundamental and Applied Chemistry.

The Faculty has seen new laboratories open over last few years. 4 laboratories were opened within the framework of 5-100 project in the Centres of Excellence. Some laboratories separated from the Laboratory of Catalytic Research (Laboratory of Physico-Chemical Analytical Methods, Laboratory of Organic Synthesis, and Laboratory of Polymers and Composite Materials). Since 2016 Faculty staff has been working in three strategic academic units (StrAU): Smart Materials and Technologies, Institute of Biomedicine, and Siberian Institute of the Future.

There are 170 full-time research and engineering and technical employees and 20 part-timers from academic institutes of Russia. 54 doctorate students including 3 overseas ones work in the laboratories as research assistants or engineers. Undergraduate and postgraduate students take part in studies at the departments and in the laboratories, which underpins classical fundamental chemistry education and certification of qualified specialists at TSU.

The cluster submitted for international accreditation jointly with the Higher Education Expo China of the Ministry of Education of the People's Republic of China (HEEC) comprises the following study programmes:

– Chemistry (04.03.01, Chemistry), since 1998;

– Fundamental and Applied Chemistry (04.05.01, Fundamental and Applied Chemistry), since 1932;

– Fundamental and Applied Chemistry of Substances and Materials (04.04.01, Chemistry), since 1998;

– Translational Chemical and Biomedical Technologies (04.04.01, Chemistry), since 2016.

The programmes are carried out by:

– Department of Inorganic Chemistry (headed by Doctor of Technical Sciences, Professor Vladimir V. Kozik);

– Department of Analytical Chemistry (headed by Doctor of Chemical Sciences, Professor Anatoliy I. Mamaev);

– Department of Organic Chemistry (headed by PhD in Chemistry, Associate Professor Yuriy G. Slizhov);

– Department of Physical and Colloidal Chemistry (headed by Doctor of Chemical Sciences, Professor Olga V. Vodyankina);

– Department of Macromolecular Compounds and Petrochemistry (headed by Doctor of Chemical Sciences, Professor Aleksandr V. Vosmerikov).

Master's programme Translational Chemical and Biomedical Technologies is also carried out by:

– Laboratory of Polymers and Composite Materials (headed by Vladimir V. Botvin);

– Laboratory for Translational Cell and Molecular Biomedicine (headed by Doctor of Biological Sciences, Professor Yulia G. Kzhyshkowska);

– Oncovirusology Laboratory of Tomsk National Research Medical Centre (headed by Doctor of Biological Sciences Nikolay V. Litvyakov);

– Laboratory of Molecular Oncology and Immunology of Tomsk National Research Medical Centre (headed by Doctor of Biological Science, Professor Nadezhda V. Cherdyntseva);

– TSU Laboratory of Physico-Chemical Analytical Methods (headed by Dmitry V. Novikov).

The main achievements in the study programmes are given in Annex 1.

Tables 1-3 contain information about the educational institution and study programmes to be accredited.

Table 1 – Educational institution

Full name	Federal State Autonomous Educational Institution of Higher Education National Research Tomsk State University
Founders	Russian Federation, Ministry of Education and Science of the Russian Federation
Year of foundation	1878 – Siberian Imperial University 1888 – Tomsk University 1934 – V. V. Kuibyshev Tomsk University 2002 – State education institution of higher vocational education Tomsk State University 2011 – Federal State State-Funded Educational Institution of Higher Vocational Education National Research Tomsk State University 2014 – Federal State Autonomous Educational Institution of Higher Education National Research Tomsk State University
Current state accreditation status	
Location	Lenin ave. 36, Tomsk, 634050, Russian Federation
Rector	Doctor of Psychological Sciences, Professor Eduard V. Galazhinskiy
Licence	Series 90L01 No8044 registration No 1067 dated 28.07.2014 in perpetuity
State accreditation	Certificate of State Accreditation Series 90A01 No 2731, registration No 2603 dated 29.05.2017, expiry date 29.05.2023
Number of students	Total number 14112 Full-time 11452 Part-time 1037 Extramural 1623

Table 2 – Study programmes to be accredited

Study programme	Chemistry (04.03.01, Chemistry)
Degree / Duration	Bachelor's degree / 4 years
Faculty (head)	Faculty of Chemistry (Dean Yuriy G. Slizhov, PhD Chemistry, Associate Professor)
Graduating department (head)	– Department of Inorganic Chemistry (headed by Doctor of Technical Sciences, Professor Vladimir V. Kozik); – Department of Analytical Chemistry (headed by Doctor of Chemical Sciences, Professor Anatoliy I. Mamaev); – Department of Organic Chemistry (headed by PhD Chemistry, Associate Professor Yuriy G. Slizhov); – Department of Physical and Colloidal Chemistry (headed by Doctor of Chemical Sciences, Professor Olga V. Vodyankina); – Department of Macromolecular Compounds and Petrochemistry (headed by Doctor of Chemical Sciences, Professor Aleksandr V. Vosmerikov).
Expertise	23-25 October 2019
Responsible for accreditation	Tatyana V. Rudenko, PhD Pedagogy, Associate Professor, Centre for Public Professional and International Accreditation of Educational Programmes
	Vladimir V. Shelkovnikov, PhD Chemistry, Associate Professor, Deputy Dean for Academic Affairs at the Faculty of Chemistry

Study programme	Fundamental and Applied Chemistry (04.05.01, Fundamental and Applied Chemistry)
Degree / Duration	Specialist / 5 years
Faculty (head)	Faculty of Chemistry (Dean Yuriy G. Slizhov, PhD Chemistry, Associate Professor)
Graduating department (head)	– Department of Inorganic Chemistry (headed by Doctor of Technical Sciences, Professor Vladimir V. Kozik); – Department of Analytical Chemistry (headed by Doctor of Chemical Sciences, Professor Anatoliy I. Mamaev);

	– Department of Organic Chemistry (headed by PhD Chemistry, Associate Professor Yuriy G. Slizhov); – Department of Physical and Colloidal Chemistry (headed by Doctor of Chemical Sciences, Professor Olga V. Vodyankina); – Department of Macromolecular Compounds and Petrochemistry (headed by Doctor of Chemical Sciences, Professor Aleksandr V. Vosmerikov).
Expertise	23-25 October 2019
Responsible for accreditation	Tatyana V. Rudenko, PhD Pedagogy, Associate Professor, Centre for Public Professional and International Accreditation of Educational Programmes
	Vladimir V. Shelkovnikov, PhD in Chemistry, Associate Professor, Deputy Dean for Academic Affairs at the Faculty of Chemistry

Study programme	Fundamental and Applied Chemistry of Substances and Materials (04.04.01, Chemistry)
Degree / Duration	Master's / 2 years
Faculty (head)	Faculty of Chemistry (Dean Yuriy G. Slizhov, PhD Chemistry, Associate Professor)
Graduating department (head)	– Department of Inorganic Chemistry (headed by Doctor of Technical Sciences, Professor Vladimir V. Kozik); – Department of Analytical Chemistry (headed by Doctor of Chemical Sciences, Professor Anatoliy I. Mamaev); – Department of Organic Chemistry (headed by PhD Chemistry, Associate Professor Yuriy G. Slizhov); – Department of Physical and Colloidal Chemistry (headed by Doctor of Chemical Sciences, Professor Olga V. Vodyankina); – Department of Macromolecular Compounds and Petrochemistry (headed by Doctor of Chemical Sciences, Professor Aleksandr V. Vosmerikov).
Expertise	23-25 October 2019
Responsible for accreditation	Tatyana V. Rudenko, PhD Pedagogy, Associate Professor, Centre for Public Professional and International Accreditation of Educational Programmes
	Vladimir V. Shelkovnikov, PhD in Chemistry, Associate Professor, Deputy Dean for Academic Affairs at the Faculty of Chemistry

Study programmes	Translational Chemical and Biomedical Technologies (04.04.01, Chemistry)
Degree / Duration	Master's degree / 2 years
Faculty (head)	Faculty of Chemistry (Dean Yuriy G. Slizhov, PhD Chemistry, Associate Professor) StrAU Institute Smart Materials and Technologies (Irina A. Kurzina, Doctor of Physics and Mathematics, Professor)
Graduating department (head)	– Department of Inorganic Chemistry (headed by Doctor of Technical Sciences, Professor Vladimir V. Kozik); – Department of Analytical Chemistry (headed by Doctor of Chemical Sciences, Professor Anatoliy I. Mamaev); – Department of Organic Chemistry (headed by PhD Chemistry, Associate Professor Yuriy G. Slizhov); – Department of Physical and Colloidal Chemistry (headed by Doctor of Chemical Sciences, Professor Olga V. Vodyankina); – Department of Macromolecular Compounds and Petrochemistry (headed by Doctor of Chemical Sciences, Professor Aleksandr V. Vosmerikov).
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	Vladimir V. Shelkovnikov, PhD Chemistry, Associate Professor, Deputy Dean for Academic Affairs at Faculty of Chemistry

Table 3 – Admission

	2014	2015	2016	2017	2018	2019
04.03.01, Chemistry						
State funded	25	25	25	25	28	30
Tuition fee paying	6	7	5	2	6	no data
04.04.01, Chemistry						
State funded	18	18	20	25	25	40
Tuition fee paying	0	0	0	0	1	no data
04.05.01, Fundamental and Applied Chemistry						
State funded	50	50	46	50	40	23
Tuition fee	14	10	6	3	10	no data
Translational Chemical and Biomedical Technologies (04.04.01, Chemistry)						
State funded			10	10	10	10
Tuition fee paying			0	0	0	no data

II COMPLIANCE WITH PUBLIC AND VOCATIONAL ACCREDITATION STANDARDS OF NATIONAL CENTRE FOR PUBLIC ACCREDITATION

2.1 Standard 1. Policy (objectives, development strategy) for quality assurance

Documented internal quality assurance system providing continuous quality improvement in compliance with the development strategy of the institution in place

The TSU quality assurance system complies with Standard ISO 9001:2015 certified by Bureau Veritas (Annex 2).

The TSU quality assurance policy is designed to reach high quality results in education, research, and innovation, which are the main pillars of steady development and contribute to the achievement of high quality of the university management system and fulfillment of requests and needs of stakeholders.

Achieving the main goal will be ensured by solving the following tasks:

– continuous enhancement of the quality management system by meeting the requirements and recommendations of ISO 9001;

– continuous improvement of the efficiency of work processes including the main and auxiliary ones;

– establishment of close relationships with organisations and strategic partners interested in the university graduates:

- Institute of Petroleum Chemistry of the Siberian Branch of the Russian Academy of Sciences (Tomsk), Research Centre Institute of Catalysis of the Siberian Branch of the Russian Academy of Sciences (Novosibirsk), Tomskneftekhim, NIOST (Tomsk), Norilsk Nickel, and Administration of Tomsk Region for the study programmes in subject areas 04.03.01, 04.04.01 Chemistry, specialisation 04.05.01 Fundamental and Applied Chemistry;
- Siberian State Medical University, Chemistry Faculty of Moscow State University, Research Institute of Oncology of Tomsk National Research Medical Centre, Research Institute of Cardiology of Tomsk National Research Medical Centre for the study programme Translational Chemical and Biomedical Technologies.

– labour market research and flexible development of the main and additional study programmes;

– resource support for all work processes with a focus on internationalisation and internationally recognised scientific achievements;

– improvement of postgraduate and doctoral studies;

– introduction of study programmes carried out jointly with leading domestic and overseas universities:

- Karaganda State University (Kazakhstan), North China University of Technology (China), and Shenyang Polytechnic University (China) for the study programmes in subject areas 04.03.01, 04.04.01 Chemistry;
- Tomsk National Research Medical Centre (Russia), Heidelberg University (Germany), the University of Münster (Germany), Leiden University (The Netherlands), and ParisTechk (France) for study programme Translational Chemical and Biomedical Technologies;

– attraction of students from leading international universities to study at Russian universities;

– studies within the programme of fundamental scientific research in the Russian Federation with involvement and under supervision of leading Russian and overseas scientists.

TSU was the first Russian university to establish The Council of Industrial Partners in 2015. The Council of Industrial Partners is an expert-analytical and advisory management body of TSU.

TSU has agreements and successfully collaborates with:

– industry: 80 high-tech companies, 35 small innovation businesses. In 2018 TSU made an agreement with new industrial partners National Association for Technology Transfer, Slolkovo Institute of Science and Technology, University 20.35, Perfumery and Cosmetic Association of Russia, National Union of Transport and Logistics Experts, Mikron PJSC, Russian Chemistry Protection (Roskhimzaschita) Corporation, ArtLife, Innovation Centre Biruch – NT (Group of Companies EFKO), Group of Companies Siberian Alliance, Softline Trade, Research and production company Integral, etc.;

– research organisations: over 40 agreements on joint research and development; 14 TSU basic departments have been opened on the basis of academic institutes, industrial enterprises and institutions;

– overseas partners: over 200 agreements with educational institutions, businesses, and authorities;

– research networks and associations: TSU is part of 13 global research networks;

– employers: Siberian Agrarian Group, Research Institute of Semiconductor Devices, Russian Federal Nuclear Centre-All-Russian Research Institute of Experimental Physics (Sarov), Russian Federal Nuclear Centre-All-Russian Research Institute of Technical Physics (Snezhinsk), Tomskneftekhim, V.E. Zuev Institute of Atmospheric Optics, Research and Production Centre Polus, Micran, Information Satellite Systems-ISS Reshetnev Company (Zhelesnogorsk), Siberian Chemical Combine, Tomsk Oil and Gas Research and Design Institute (TomskNIPIneft), Tomsk National Research Medical Centre of the Russian Academy of Sciences, Department for Education of Tomsk administration (Tomsk schools), Administration of Tomsk Region Investigative Department of the Investigative Committee of the Russian Federation in Tomsk Region, Federal Drug Control Service of the Russian Federation in Tomsk Region, Federal Penitentiary Service of the Russian Federation in Tomsk Region, Pension Fund of the Russian Federation in Tomsk Region, Norilsk Nickel, etc.;

– institutions of comprehensive education: 3,773 scholars and 332 teachers from 58 Tomsk schools take part in carrying out 8 network study programmes;

– patrons and commercial banks: in 2017, TSU set up the first Russian university venture fund (management company DI-Group); 2018 saw some investment in the first joint project of TSU scientists and X5 Retail Group. TSU Endowment Fund started its work in 2010 (fund of targeted capital) reaching 38.5 mln rubles by the end of 2018 owing to donations from individuals and legal entities.

Involvement of stakeholders (administration, teaching staff, students, employers, employer associations, profile ministries and bodies that are key partners in employment of graduates) into design and implementation of quality assurance policy by means of relevant structures and processes

Management system of the programme is described in paragraph 5 of the Regulations on Study Programmes of Higher Education at TSU (http://www.tsu.ru/upload/medialibrary/8c3/polozhenie_ob_osnovnoy_obrazovatelnoy_programme.pdf). The system efficiency is achieved through:

– responsive management (Head of the study programme, Dean);
– organisation management (TSU Academic Division),
– strategic management (TSU Academic Board).

The study programmes specify procedure and principal mechanisms for receiving feedback from interested parties (Annexes 3.1 – 3.4).

The existing management system is multi-level and allows programme heads to involve employers, students, and teaching staff in analysis, design, implementation, and monitoring of the programme ensuring the quality of education.

Thus, specialists of the Institute of Petroleum Chemistry of the Siberian Branch of the Russian Academy of Sciences, Tomsk Polytechnic University, and TSU Siberian University of Physics and Technology take part in carrying out the Bachelor's programme Chemistry.

Specialists of the Institute of Petroleum Chemistry of the Siberian Branch of the Russian Academy of Sciences, Tomsk Polytechnic University, TSU Siberian University of Physics and Technology, and chemistry teachers of the highest category from Tomsk schools (teaching practice) carry out the Specialist's programme Fundamental and Applied Chemistry.

Specialists of the Institute of Petroleum Chemistry of the Siberian Branch of the Russian Academy of Sciences, TSU Siberian University of Physics and Technology, NIOST, Forensic Center of the Department of the Ministry of Internal Affairs in Tomsk Region, and Leiden University (The Netherlands) carry out the Master's programme Fundamental and Applied Chemistry of Substances and Materials.

Heidelberg University (Germany), the University of Münster (Geramany), Leiden University (The Netherlands), Group of companies Pharmcontract (Moscow), and ParisTechk (France), Tomsk National Research Medical Centre of RAS (Tomsk), Alphram (Moscow), Innovative Pharmacology Research (IPHAR) (Tomsk), Federal Research and Production Centre Altay (Biysk), and ArtLife (Tomsk) are key partners in implementing the programme Translational Chemical and Biomedical Technology.

Employers are invited to do monitoring research on assessment of the quality of training by setting requirements for would-be specialists and estimating graduates' preparedness for professional activity. Results of 2019 employer's satisfaction survey are presented in Annex 5.

Students are a key element in internal quality assurance system. They are involved in assessment of residual knowledge and regular feedback surveys. Results of 2019 student's satisfaction survey are presented in Annex 6.

Involvement of units of the institution in processes and procedures of internal quality assurance system

The Dean's office of the Faculty of Chemistry and Academic Office of the study programme Translational Chemical and Biomedical Technologies along with the TSU Academic Division, Centre for Public Professional and International Accreditation of Educational Programmes, Employment and Career Service, and Centre for Education Quality Improvement are responsible for quality assurance.

Conclusions on Standard 1:

Strengths:

1. Effective multi-level system of programme management.
2. Resources (human, financial, technical, and others) for internal quality assurance.

Aspects to be improved:

1. Systematic collection and analysis of feedback from prospective students and students on their motivation and satisfaction with learning conditions.
2. Extending the network of employers participating in monitoring studies and strengthening the partnership by cooperation agreements.

2.2 Standard 2. Design and approval of programmes

Accessibility of clearly specified and communicated, documented, approved, and published objectives of the study programme and learning outcomes and their compliance with the mission, goals and objectives of the institution

Objectives of the programme, their focus, and learning outcomes are specified in the study programmes in relevant subject areas/specialisations and approved by the TSU Rector (Annex 3.1 – 3.4, 3.1.2, 3.2.2, 3.3.1, 3.4.2, 3.1.3, 3.2.3, 3.3.2, 3.4.3). Documents are available on the websites:

- of TSU, Sections Education/Bachelor's/Specialist's/Master's
http://www.tsu.ru/education/bacalavr/scroll_bacalavr.php;
http://www.tsu.ru/education/speciality/programs_speciality.php;
http://www.tsu.ru/education/magistratura/magisterskie_programmy.php;
- of the Faculty of Chemistry, Section Education http://chem.tsu.ru/node/28.
- of Master's programme Translational Chemical and Biomedical Technologies
http://ltcmb.tsu.ru/study/magisterskaya-programma/osnovnaya-dokumentatsiya/

Study Programme Chemistry is aimed at preparing highly qualified specialists possessing fundamental and applied knowledge of chemistry and able to do research to solve fundamental and applied problems in chemistry. The programme is designed to develop universal, general professional, and professional competencies in compliance with the requirements of the Federal State Educational Standard of Higher Education in subject area 04.03.01 Chemistry.

Special feature of the programme is its focus on preparing graduates for professional activities in chemistry, chemical, biochemical, petrochemical, oil refining, and other related fields of industry and science.

Study Programme Fundamental and Applied Chemistry aims to prepare highly qualified specialists possessing fundamental and applied knowledge and able to independently and effectively implement innovations in chemical industry, science, and education. The programme is designed to develop universal, general professional and professional competencies in compliance with the requirements of the Federal State Educational Standard of Higher Education in specialisation 04.05.01 Fundamental and Applied Chemistry.

Of great importance is preparing graduates in the field of modern materials studies and nanotechnology. Graduates of the programme are prepared for research, pedagogical, and technological activities.

Study Programme Fundamental and Applied Chemistry of Substances and Materials prepares Master's students able to work independently in research and production institutions and chemical, petrochemical, pharmaceutical and other related industries and at universities of chemistry and technology profile as teachers.

The programme focuses on preparing Master's students in chemistry knowing modern methods of synthesis and research on substances and materials of various nature able to study, do experiments, and teach.

Study Programme Translational Chemical and Biomedical Technologies aims to prepare Master's students able to work independently in research and production institutions and chemical, petrochemical, pharmaceutical and other related industries and at universities of chemistry and technology profile as teachers.

The study programme is intended to combine chemical and biotechnological approaches to development and implementation of new chemical substances and materials for biomedical purposes, modern diagnostic and therapeutic methods and tools.

Originals are kept at the Dean's office of the Faculty of Chemistry (TSU Building 6, Arkadiy Ivanov st. 49, room 107, Tomsk, 634028, Russia); for study programme Translational Chemical and Biomedical Technologies at the office of the programme (Building 13, Lenin ave. 36, room 42, 634050, Tomsk).

Objectives and learning outcomes of the programme are formulated in compliance with the Mission of National Research Tomsk State University (http://www.tsu.ru/university/mission.php) and meet the requirements of the TSU Independently Established Educational Standards of Higher Education (TSU IEES) in subject areas 04.03.01, 04.04.01 Chemistry, specialisation 04.05.01 Fundamental and Applied Chemistry (Annexes 3.1.1, 3.2.1, 3.4.1) and requirements of professional standards.

Procedures for development, approval, and adjustment of the study programme including learning outcomes in view of the development of science and production and stakeholders' opinion (administration, teaching staff, students, employers)

Update and adjustment mechanisms in compliance with the market demand are specified in the Regulations on the Study Programme (http://www.tsu.ru/upload/medialibrary/8c3/polozhenie_ob_osnovnoy_obrazovatelnoy_programme.pdf).

Reasons for updating the programme:

- development of priority areas of science and technology;
- initiative and proposals of the Head of the programme;
- quality assessment results;
- significant changes in conditions of implementation of the study programme including Federal State Educational Standards of Higher Education / TSU Independently Established Educational Standards.

Updates are reflected in such documents as curriculum, syllabi, programmes of internship, etc.

Professional standards and labour market demands result in necessary changes in the programme. Consumer requirements are defined through monitoring of the labour market and graduates' activity and employment.

Requirements of professional standards (if applicable), labour market, and descriptors of the National Framework of Qualifications in the study programme

The content of the programmes is focused on the needs of the labor market and requirements of professional standards of the Ministry of Labor of the Russian Federation.

Name of the study programme	Professional standard (code, name)
Chemistry (Bachelor's)	PS 40.011 Specialist in research and development
	PS 40.136 Specialist in development, maintenance and integration of technological processes and production in the field of materials science and materials technology
Fundamental and Applied Chemistry of Substances and Materials (Master's)	PS 01.004 Teacher of vocational training, vocational education and continuing education
Fundamental and Applied Chemistry (Specialist's)	PS 40.008 Specialist in organisation and management of research and development
	PS 40.011 Specialist in research and development
	PS 40.136 Specialist in development, maintenance and integration of technological processes and

	production in the field of materials science and materials technology
Translational Chemical and Biomedical Technologies (Master's)	PS 01.004 Teacher of vocational training, vocational education and continuing education
	PS 40.008 Specialist in organisation and management of research and development
	PS 40.011 Specialist in research and development
	PS 02.010 Specialist in industrial pharmacy in the field of pharmaceuticals production

Conclusions on Standard 2:

Strengths:

1. Accurate mechanisms for updating and adjusting the study programmes.
2. Focus on requirements of the market and professional standards.
3. Involvement of employers in implementation and management of the programmes (discussion of objectives, modules of practical classes, targeted selection of graduates during their study).

Aspects to be improved:

1. Organisation of monitoring to assess market conditions and competitors in the educational market in order to effectively transform the programmes and adjust them to specific consumers.
2. Consideration of the requirements of international professional community.
3. Consideration of the requirements of industrial professional standards.

2.3 Standard 3. Student-centred learning, teaching and assessment

Consideration of the needs of diverse groups of students and opportunities to develop individual learning path

Student-centred learning is a priority in the university development. Physically and mentally challenged people are provided with conditions in view of their mental and physical development, individual abilities, and health state.

Learning can be organised in line with both standard curriculum and academic calendar and individual learning plan. Regulations on individual learning plans, Regulations on student individual curriculum are presented on the TSU website in section Academic Division (http://www.tsu.ru/upload/medialibrary/57a/212-od-reglament-raboty-s-individualn-planami-_1_.pdf).

Documents regulating arrangement of special learning conditions and other aspects of work with special categories of people are specified by the TSU Admissions Rules (http://abiturient.tsu.ru/sites/default/files/pravila_priema_2019_bakalavr_spetsial_magistr_30012019.pdf); Regulations on Learning of People with Disabilities at NR TSU (http://www.tsu.ru/upload/medialibrary/8e0/polozhenie_ob_obuchenii_invalidov_i_lits_s_ogranichennymi_vozmozhnostyami.pdf).

To create a barrier-free environment at TSU, educational buildings and residence halls are equipped with facilities to overcome architectural barriers (ramps, lifting devices, caterpillar lifts) (http://www.tsu.ru/university/social/Accessible_environment.php).

The TSU Institute of Distance Learning (http://ido.tsu.ru) offers a set of distance learning technologies and resources allowing various groups of students to get a broader access to higher and additional education.

The social services system enables continuous consideration of students' individual characteristics through the entire learning period. The Deputy Dean for Social Services is responsible for assurance of social services at the Faculty. Experienced teachers and tutors act as supervisors and curators to help vulnerable groups of first-year students to adapt to the learning environment.

Excessive learning environment contributes to students' inclusion. In 2018/2019 academic year, the Faculty of Chemistry held 3 international conferences attended by 90 students. The Faculty hosted 4 cycles of public lectures of visiting domestic and overseas researchers. Moreover, students organise such events, which contributes to the development of new competencies and soft skills. In 2019, 9 student teams of the Faculty of Chemistry participated in International Engineering Championship CASE-IN (student league) in Petrochemistry. Winners presented TSU in the final in Moscow.

Chemistry students are participants of student contests in chemistry, physics, mathematics, history, philosophy, economics, and ecology. In 2018/2019 academic year 112 students took part in contest I am Professional in chemistry and 28 in biotechnology.

Culture, creativity, and interaction are supported by the Student Trade Union of the Faculty of Chemistry. The Union annually organises Freshman Day, Initiation Party, Halloween in English, and Mister and Miss of the Chemistry Faculty http://chem.tsu.ru/node/493. 50 different sport events take place every year. In 2017, the Faculty of Chemistry won the TSU Sports games.

Needy students are supported with financial aid (http://www.tsu.ru/upload/medialibrary/ead/8.pdf).

To create comfortable social and cultural conditions for life and study of overseas students the TSU International Division has set up the Department of Social Adaptation and Support of TSU International Students (http://inter.tsu.ru/).

Selection of individual learning paths can be seen through students' choice of modules in subject areas and modules focused on developing professional competencies; places of

internship; research supervisors; topics for research, project or dissertation; elective courses; participation in extracurricular activities.

One of the forms of elective courses is university campus courses, i.e. ***courses in various subject areas that can be taken by students of any faculty/year/study programme.***

Personality-oriented learning environment enables students to demonstrate their intellectual abilities and creative potential through participation in scholarship contests, grants, conferences, scientific seminars, etc.

Use of methods encouraging students to take an active role in creating the learning process

Questionnaire is one of the methods actively used to encourage students to join the creation of the learning process.

Surveys help to obtain reliable and unbiased information on strengths and weaknesses of the learning process and to improve the programme.

Results of the survey on students' satisfaction with the study programmes allow us to conclude that students have a fairly high assessment of the quality of education. The 2019 survey results are presented in Annex 6.

Results of student's satisfaction survey were discussed at the meeting of the Academic Board of the Faculty of Chemistry (minute No10 dated 27.06.2019), whose members set possible changes in the content and structure of the study programmes.

In order to ensure students' rights to participate in university management and to address important issues of student life, public activity, and support and implementation of social initiatives, the Joint Council of Students has been founded (http://www.tsu.ru/university/social/obedinennyy_sovet_obuchayushchikhsya.php).

Use of explicit criteria and unbiased procedures of assessment of learning outcomes / competencies in accordance with the intended learning outcomes, objectives of the study programme and purpose (diagnostic, continuous, final assessment)

Assessment procedures and assessment criteria have been developed for each discipline, each type of practice, and final state examination and formed as assessment tools.

Mid-term examination of student performance is based on pass/fail exams and exams. Continuous assessment in each study programme relies on tests, individual assignments, practical and laboratory assignments, and presentations at seminars. Assessment procedure is stated in the Regulations on Continuous Assessment and Mid-term Examination of TSU Students No 317/OD dated 02.04.2019 (http://www.tsu.ru/upload/medialibrary/7d1/317-od-polozhenie-o-tek-kontrole-i-promezhut-attestatsii.pdf).

Combination of continuous assessment, mid-term and final examination allows teaching staff to consistently assess the stages of formation of competencies. Results of mid-term examination are recorded in statements; results of defence of theses are recorded in the minutes of meetings and reports of the Chairmen of the State Examination Board.

Every year at the beginning of each semester students of all years undertake an assessment of residual knowledge.

Defence of theses is held in accordance with the Regulations on Procedure of Final State Examination in Bachelor's, Specialist's, Master's Programmes at NR TSU No315/OD dated 02.04.2019 (http://www.tsu.ru/upload/medialibrary/05c/315-od-polozhenie-o-provedenii-gia-_1_.pdf), final state examination programmes (Annex 7.1-7.4).

Requirements for design and structure of Bachelor's, Specialist's, and Master's theses are specified in the Regulations on Bachelor's and Specialist's Theses at NR TSU No284/OD dated 27.03.2018 (http://www.tsu.ru/upload/medialibrary/471/polozhenie_o_vkr_bakalavra_i_spetsialista.pdf) and

Regulations on Master's Thesis at TSU No 352/OD dated 12.05.2016 (http://www.tsu.ru/upload/medialibrary/664/polozhenie-o-magisterskoy-dissertatsii.pdf).

A state examination was added to the module of final state examination to assess competency in pedagogy of the 2018/2019 intake for Specialist's programmes and 2019/2020 Master's programmes in accordance with IEES.

Systematic discussion of student progress at the meetings of the departments allows teaching staff to assess student preparedness and adjust assessment tools, assessment criteria, and organisation technology.

Information about the study programme, used criteria and procedures for assessment of learning outcomes / competencies, about exams, pass/fail exams and other forms of control

Information about the cluster of the study programmes is available on the website of the Faculty of Chemistry, Section Applicants http://chem.tsu.ru/, at the TSU website for applicants http://abiturient.tsu.ru/ru/content/%D0%B1%D0%B0%D0%BA%D0%B0%D0%BB%D0%B0%D0%B2%D1%80%D0%B8%D0%B0%D1%82%D1%81%D0%BF%D0%B5%D1%86%D0%B8%D0%B0%D0%BB%D0%B8%D1%82%D0%B5%D1%82, http://abiturient.tsu.ru/ru/content/%D0%BC%D0%B0%D0%B3%D0%B8%D1%81%D1%82%D1%80%D0%B0%D1%82%D1%83%D1%80%D0%B0; TSU website in section Education / list of Bachelor's programmes http://www.tsu.ru/education/bacalavr/scroll_bacalavr.php, list of Specialist's programmes http://www.tsu.ru/education/speciality/programs_speciality.php, list of Master's programmes http://www.tsu.ru/education/magistratura/magisterskie_programmy.php. Information about the programme Translational Chemical and Biomedical Technologies is presented on the website of the programme http://ltcmb.tsu.ru/study/magisterskaya-programma/ and the StrAU website http://smti.tsu.ru/ru/education/chemical-and-biomedical/.

Social networking site VKontakte is used to inform students (https://vk.com/hf_tsu). Email distribution list forwards students information from the Academic Division, e-learning Department, and Digital Transformation Department. Announcements on the information stand in Building 6 keep students up to date.

Criteria and description of the assessment procedure for particular disciplines are specified in the syllabi and available in Moodle.

All the units publish information about exams, pass/fail exams, and re-sit timetable.

Documents regulating the organisation of the learning process including continuous assessment, mid-term and final examination are available on the TSU website in section Academic Division http://www.tsu.ru/education/upr/materialy_po_organizatsii_uchebnogo_protsessa.php

Dean's Office of the Faculty, Heads of the study programmes, group monitors, and teaching staff regularly inform students.

Use of independent assessment of learning outcomes

Programmes of the Faculty of Chemistry and StrAU Smart Materials and Technology were accredited in accordance with the Federal State Educational Standards on 29.05.2017. The accreditation was done by independent experts and valid until 2023.

Assessment of the development of professional competencies and personality traits of graduates relies on results of defence of dissertations, supervisors' and reviewers' feedback, reports of the Chairmen of State Examination Boards, employers' review and references given after internship, publications and presentations at all-Russian and international conferences, scholarships and prizes for achievements in professional activity.

Employers take part in independent assessment of learning outcomes. They are members of the State Examination Board and make up at least 50% of the members. If students have an

on-site training or internship to gain professional skills, employers give an independent assessment providing students with references recorded in the internship diary.

A formal procedure for student appeals and complaints in place

Students' complaints received online are accumulated at the Academic Office and forwarded to the heads of departments and management of the programme. The Faculty administration deals with complaints orally or through a written word regarding the situation.

Students have not complained so far. If there is a precedent, teaching staff and administration of the Faculty will establish an appeal committee.

The TSU Student Trade Union defends students' interests in curricular and extracurricular aspects (http://studprofcom.tsu.ru/). Formal procedure consists in keeping minutes of meetings of student organisations (Student Trade Union, Joint Student Council, etc.) with specified solutions to problems in questions.

Conclusions on Standard 3:

Strengths:

1. Programmes are structured in line with the needs of different groups of students. Personality-centred excessive learning environment contributes to student development in various aspects.
2. Campus courses.
3. Accessible explicit criteria of assessment of learning outcomes.
4. Public information.

Aspects to be improved:

1. More information about social scholarships and allowance.
2. Publication of learning materials in Moodle.

2.4 Standard 4. Student admission, progression, recognition and certification

Career guidance system aimed at training and selecting applicants

At Bachelor's/Specialist's/Master's level career guidance consists in:

– informing students about topical changes in the content of the programme, selection criteria, learning conditions, prospective employers through the websites of the university, Faculty, social networking sites (https://vk.com/hf_tsu, http://abiturient.tsu.ru/);

– organising University Open Days;

– organising work of school Young Chemist targeted at pupils of 9-11 classes;

– organising annual public regional contests for pupils Future of Siberia, open regional interuniversity contest, North-East Schoolchildren Contest, regional stage of the All-Russian Schoolchildren Contest in Chemistry with participants from Tomsk, Siberian Federal District, CIS, and other countries;

– organising annual student contest I am Professional, Open Doors, which serve as a key to early admission and tuition-free learning in Master's programme in chosen profile;

– holding annual student scientific conference;

– organising Faculty Open Days and workshops by specialists / employers (http://chem.tsu.ru/node/463);

− participation of students in the Admissions Committee of the Faculty of Chemistry;

− membership of the teaching staff in Russian and international professional communities, expert boards including review boards on defence of doctorate degrees founded on the basis of Tomsk State University, Tomsk Polytechnic University, and Institute of Petroleum Chemistry;

– participation in international and regional professional competitions and contests.

The system for identifying the most qualified students has been implemented:

− through preliminary interview with people willing to enter study programmes Fundamental and Applied Chemistry of Substances and Materials, Translational Chemical and Biomedical Technologies;

− on the basis of the documents – personal data, average score from the score book;

− on the basis of the assessment of knowledge and skills obtained while studying at the previous tier of education.

Students are involved in competitions, conferences, grants provided by TSU funds and other organisations. Students can get information about all relevant events at the university Youth Centre (http://www.tsu.ru/science/sciactivity/centr.php) (Mayor's Prize, Governor's Prize, V. Potanin Charity Fund, V.I. Vernadskiy Non-Government Environmental Fund, etc.)

Effective admission and transfer from other educational institutions, recognition of qualifications, learning periods and previous education

Entrance examination procedure is held in accordance with the TSU Admissions Rules for 2019/2020 academic year http://abiturient.tsu.ru/sites/default/files/pravila_priema_2019_bakalavr_spetsial_magistr_30012019.pdf.

The entrance examination programme for Bachelor's and Specialist's programmes consists of exams in chemistry, mathematics (profile), and the Russian language. Russian citizens take state exams. Non-Russian citizens take exams held independently by TSU. Applicants have to take a written exam in chemistry and interview on the profile of the programme to enter the Master's programme.

The entrance examination programmes are developed by the Faculty of Chemistry and are available on the website of the Faculty (http://chem.tsu.ru/enrollee) and in Annex 8.

Tuition-fee paying students have an opportunity to get a state-funded place if they have significant achievements in learning, research, and public activity and if there are available state-funded places at the Faculty.

TSU has Regulations on Student Transfer from other Faculties and Educational Institutions (http://tsu.ru/upload/medialibrary/872/polozhenie-o-perevode-studentov.pdf).

Annex 9 presents data on the enrollment of students for the programmes announced for accreditation for the last 5 years.

Demand on the study programmes is confirmed by:

– ***competition:***

in 2017/2018 academic year		
Subject area/specialisation	Number of applications	Passing grade
04.03.01, Chemistry	242	240
04.04.01, Chemistry Fundamental and Applied Chemistry of Substances and Materials	39	138
04.05.01, Fundamental and Applied Chemistry	243	222
04.04.01, Chemistry Translational Chemical and Biomedical Technologies	10	135
in 2018/2019 academic year		
04.03.01, Chemistry	326	238
04.04.01, Chemistry Fundamental and Applied Chemistry of Substances and Materials	37	140
04.05.01, Fundamental and Applied Chemistry	336	228
04.04.01, Chemistry Translational Chemical and Biomedical Technologies	10	135
in 2019/2020 academic year		
04.03.01, Chemistry	264	244/228
04.04.01, Chemistry Fundamental and Applied Chemistry of Substances and Materials	35	129
04.05.01, Fundamental and Applied Chemistry	272	243/228
04.04.01, Chemistry Translational Chemical and Biomedical Technologies	21	135

– ***programme recognition*** – students from Tomsk, Novosibirsk Region, Altay Region, Kemerovo Region, Omsk Region, Krasnodar Region, Buryatiya and others enter the programmes.

There are students from the People's Republic of China, Kazakhstan, Kyrgyzstan, Turkmenistan;

– ***students' successful employment*** upon graduation (within one year after graduation):

Study programme	Graduates employed in the study programme profile, %			
	2015	2016	2017	2018
Chemistry (Bachelor's degree)	96	92	100	92
Fundamental and Applied Chemistry (Specialist's)	91.3	90.4	95.5	89.6
Fundamental and Applied Chemistry of Substances and Materials (Master's)	100	90	94	100
Translational Chemical and Biomedical Technologies (Master's)	-	-	-	100

According to Federal Law No 273-FZ dated 29.12.2012 On Education in the Russian Federation, Tomsk State University is allowed to independently recognise foreign education to admit people with foreign education (http://nic.gov.ru/ru/proc/other).

Support of students to make progress in their academic career

The Faculty administration (Dean's Office) support students in their academic career. It includes:

– student attendance management (continuously by the teaching staff);
– discussion of students' academic progress at meetings of the department;
– monitoring students' academic progress in the middle of the semester;
– discussion of students' semester academic progress at the meeting of the Academic Board of the Faculty of Chemistry.

Students' academic progress is closely related to research results. Owing to research network of the Faculty students can do research in leading laboratories of TSU, academic institutions of the Siberian Branch of the Russian Academy of Sciences (Tomsk, Novosibirsk, Biysk), Tomsk Polytechnic University, NIOST Sibur, etc.

Research mainly results in publication of materials and theses, research articles in journals registered in the databases of the Russian Science Citation Index, Scopus, and Web of Science.

Students present their research results at conferences and exhibitions.

The TSU Youth Centre, Academic Office of the Faculty, StrAU inform students, collect and analyse their academic achievements (http://www.tsu.ru/science/sciactivity/centr.php). Students take part in scholarship contests.

System Flamingo provides students with complete information about students' participation and achievements in conferences, contests including Increased State Academic Scholarship (http://flamingo.tsu.ru/). In 2018/2019 academic year, 21 students won the scholarship in academic achievements, culture and creativity, and sports.

Recognition of education in the country and abroad (Diploma Supplement)

Annually, the Office of Paid Educational Services provides graduates applying for a job or internship abroad with a Diploma Supplement of European standard (http://www.tsu.ru/education/opou/evropeyskoe_prilozhenie_k_diplomu.php). Diploma Supplement samples in subject areas 04.03.01 Chemistry, 04.04.01 Chemistry are available in Annexes 10.

Student mobility programmes

The TSU Centre for Joint Academic Programmes is responsible for organisation and implementation of new study programmes in partnership with leading domestic and overseas universities and scientific institutions (http://cjiap.tsu.ru/).

The TSU Center for Academic Mobility enables mobility of undergraduate and postgraduate students and teaching staff within the TSU Competitiveness Programme (https://vk.com/club73824070).

Financing is carried out on a competitive basis for the following types of mobility: international summer schools, academic seminars, international conferences; sort-term exchange programmes, and joint student research projects. Applicant's academic achievements, foreign language proficiency, and compliance of the topic with one of the priority directions of the TSU development are priority for a positive decision in all types of mobility.

The regulations on competition on individual financial support of undergraduate and postgraduate students for short-term programmes of academic mobility are available on the TSU website http://viu.tsu.ru/documents/normative/27/.

26 students of the Faculty of Chemistry were funded in 2018/2019 academic year to take part in international conferences / forums/ contests.

Students participated in CASE-IN (Moscow), International Conference Lomonosov-2019 (Moscow), 57 International Scientific Student Conference ISSC-19 (Novosibirsk), European congress on catalysis EUROPACAT-2019 (Aachen, Germany), The 8th Asia-Pacific Congress on Catalysis APCAT-8 (Bangkok, Thailand), etc.

Students participate in workshops and learning events which take place in the framework of international projects at the Faculty of Chemistry. In 2018, they took part in V International Scientific School-Conference of Young Researchers Catalysis: from Science to Industry (25-29 September 2018); XVI International Conference of Students and Young Scientists Prospects of Fundamental Sciences Development-2019 (23.04.2019-26.04.2019); International Scientific Conference Multifunctional Chemical Materials and Technologies (22.05.2019-25.05.2019).

Conclusions on Standard 4:

Strengths:

1. Effective admissions procedure.
2. Systematic academic progress monitoring and corrective work.
3. Systematic career guidance.
4. Opportunities to do research and project in regional leading scientific centres.
5. Academic mobility in place.

Aspects to be improved:

1. International mobility of students.
2. Involvement of international students in academic exchange.

2.5 Standard 5. Teaching staff

Qualified teaching staff (academic degree, academic title, industry awards, state prizes, published books, and curriculum and instruction materials)

The cluster of the study programmes is carried out by the teaching staff whose qualifications correspond to the profile of the discipline they teach.

A share of the teaching staff (given integer values of rates) whose qualifications correspond to the profile of the disciplines (module) they teach makes up 98.7% of the total number of the teaching staff carrying out the Bachelor's programme, 96.6% carrying out the Specialist's programme, and 92.86% carrying out the Master's programmes Fundamental and Applied Chemistry of Substances and Materials and Translational Chemical and Biomedical Technologies.

A share of the teaching staff (given integer values of rates) having an academic degree is 96.8% (Bachelor's programme), 95.3% (Specialist's programme), 85.7% (Applied Chemistry of Substances and Materials and Translational Chemical and Biomedical Technologies) of the total number of the teaching staff (Annex 11).

Teaching staff carrying out the study programmes are laureates of different contests and prizes, authors and co-authors of articles published in journals and conference proceedings registered in the databases of the Russian Science Citation Index, Scopus, and Web of Science. Teaching staff CVs are available in Annex 12.

Head of the Bachelor's and Specialist's programmes is full-time Associate Professor Vladimir V. Shelkovnikov, PhD Chemistry, Associate Professor at the Department of Analytical Chemistry, Deputy Dean for Academic Affairs.

V.V. Shelkovnikov's research interests focus on sensory systems for electrochemical analysis. List of his publications and research projects is available in Annex 12.

Head of Master's programme Fundamental and Applied Chemistry of Substances and Materials is Yuriy G. Slizhov, PhD Chemistry, Associate Professor, Dean of the Faculty of Chemistry, Head of the Department of Organic Chemistry.

Yu.G. Slizhov's research interests are associated with the development of methods of chromatographic studies of organic substances. List of his publications and research projects is available in Annex 12.

Head of Master's programme Translational Chemical and Biomedical Technologies is Irina A. Kurzina, Doctor of Physics and Mathematics, Professor, Head of StrAU Institute Smart Materials and Technologies. List of her publications and research projects is available in Annex 12.

Compliance of specialisations, academic degrees, titles and / or experience of the teaching staff with the profile of the study programme

Requirements for the teaching staff qualification are specified in labour contracts and instructions and reflected in individual plans.

– The share of the teaching staff (given integer values of rates) having education corresponding to the profile of the discipline (module) they teach is 98.7% for Bachelor's programme Chemistry; 92.86% for Master's programme Fundamental and Applied Chemistry of Substances and Materials; 98.7% for study programme Fundamental and Applied Chemistry; 92.34% for study programme Translational Chemical and Biomedical Technologies.

– The share of the teaching staff (given integer values of rates) from heads and employees of organisations whose activity is related to the profile of the study programme (experience in the field not less than 3 years) is 5.3% for Bachelor's programme Chemistry; 20.24% Master's programme Fundamental and Applied Chemistry of Substances and Materials; 5.8% for study programme Fundamental and Applied Chemistry; 27.8% study programme Translational

Chemical and Biomedical Technologies.

Full list of the teaching staff for the programmes to be accredited including part-timers from employers is available in Annex 11. CVs of the teaching staff including employers are available in Annex 12.

Teaching staff do research and integrate research results into the learning process

From 2016 to 2018 the teaching staff of the Faculty of Chemistry published 405 articles in scientific periodicals indexed in the databases of Russian Science Citation Index, Scopus, and Web of Science. They got 37 patents and research funding of 446,205 mln rubles.

The teaching staff does research in the framework of various programmes initiated by the governmental and non-governmental funds and companies (full list of the most significant scientific projects is available in Annex 12).

The teaching staff implemented a number of research projects, whose results served as a scientific basis for developing the cluster of programmes submitted for international accreditation.

The most significant projects currently being implemented:

20.11.2017–31.12.2019. Development of a method for producing propylene by catalytic metathesis of ethylene with 2-butene. Federal Targeted Programme for Research and Development in Priority Areas for Development of the Russian Scientific and Technological Complex for 2014-2020 (Professor O.V. Vodyankina).

01.01.2018–31.12.2019. Construction of active centers of a given local geometry on the surface of catalysts for the processes of target conversion of hydrocarbons and bio-renewable raw materials. State support of leading Russian universities to maximize their competitive position in the global research and education market (The Russian Academic Excellence Project 5-100) (Professor O.V. Vodyankina).

29.04.2019–31.12.2022. New catalysts and catalytic processes for solving the problems of environmentally friendly and resource-saving energy including processing of bio-renewable raw materials and neutralisation of emissions from chemical production and energy (Professor O.V. Vodyankina).

06.05.2019–01.10.2022. Development of metal oxide-based catalysts for import-substituting technologies. Russian Science Foundation grant (Professor O.V. Vodyankina).

26.09.2017–31.12.2019. Development of energy-saving technologies for drying compressed air in the process of compression and preparation for use in industry and transport. Federal Targeted Programme for Research and Development in Priority Areas for Development of the Russian Scientific and Technological Complex for 2014-2020 (Associate Professor Yu.G. Slizhov).

01.01.2017–31.12.2019. Comprehensive study of production processes, structural characteristics and functional properties of new sorption and optically active inorganic, organic and organic-inorganic substances and materials. State task of the Ministry of Education and Science of Russia (Associate Professor Yu.G. Slizhov).

24.07.2018–31.12.2020. New nanostructured functional materials based on complex oxides for optically transparent electrodes in photovoltaic devices (Professor V.V. Kozik).

17.04.2017–31.12.2019. Physicochemical basis for synthesis and phase formation of ion-modified biocompatible and bioresorbable hydroxyapatite under microwave exposure (Professor V.V. Kozik).

07.01.2019–31.12.2021. Physical fundamentals of hardening of ultrafine-grained titanium under conditions of irradiation with aluminum and nickel ions (Professor I.A. Kurzina).

19.03.2018–31.12.2019. Development of the fundamentals of obtaining new organic and polymer compounds and materials. State support of leading Russian universities to maximize their competitive position in the global research and education market (The Russian Academic Excellence Project 5-100) (Professor I.A. Kurzina).

01.01.2017–31.12.2019. Development of physicochemical principles of formation of thin-layer radar absorbers in the terahertz frequency range of nanostructured ceramic-metal coatings in the microplasma mode in electrolyte solutions. State task of the Ministry of Education and Science of Russia (Professor A.I. Mamaev).

29.04.2019–29.04.2020. Analytical support of the scaling process of the experimental technology of hydrodecyclization of light gas oil of catalytic cracking at a pressure of 7.0 MPa (Associate Professor O.V. Magaev).

12.03.2018–25.12.2019. Development of a technology for producing polymers for modification of red phosphorus (epichlorohydrin and epoxy resins based on it) – developpment of a technology for producing epichlorohydrin from 1,2-dichloropropane (Associate Professor V.S. Malkov).

Use of innovative teaching methods and advanced technology

Active educational methods encouraging students to active thinking and doing are used to help students achieve the intended learning outcomes. Brainstorms, seminars and discussions, business games, and projects are used to study the material.

Moreover, continuous assessment and mid-term examination imply using group assessment and peer-review by reviewing and opposing other students' reports and projects.

Active teaching methods contribute to manifestation of personality traits, skills at being persuasive and defending a viewpoint or suggested solution to the problem, and reflection on activity and results, etc.

Active teaching methods develop students' skills at planning and organising individual activities, creative and initiative qualities.

Participation of the teaching staff in joint international projects, international internship, and academic mobility programmes

The teaching staff of the Faculty of Chemistry regularly participates in international scientific and research events and internships. In summer 2019, research teams of the Faculty participated in 3 international events; The 8th Asia-Pacific Congress on Catalysis (APCAT-8), Bangkok, Thailand, 4-7 August 2019 (5 lecturers, 2 PhD students, 1 student), European Congress on Catalysis EUROPACAT-2019, Aachen, Germany 18-22 August 2019 (4 lecturers, 3 аспиранта, 2 students), 3 European Summer School on Catalyst Preparation, Vogüé, France, 16-21 June 2019 (3 lecturers).

38 faculty members took part in academic mobility programmes from 2016 to 2019.

Financial and non-financial reward of the teaching staff

The financial incentive system is based on developed regulatory documents.

Employees are financially and non-financially rewarded for achievements in educational, instructional, research, and other activities in accordance with the Regulations on Remuneration of University Employees (http://www.tsu.ru/upload/medialibrary/fa6/Polojenie%20oplate%20truda%204.09.13.pd)

The teaching staff of the Faculty of Chemistry takes part in projects and grants implementing their scientific and creative potential and being financially rewarded.

TSU annually holds a contest on development of learning, instructional issues, e-resources, monographs
(Regulations on Prizes of Tomsk State University for High Achievements in Science, Education, Development of e-Learning, Literature and Art http://www.tsu.ru/university/sovets/Academic_Council/).

In 2017, the teaching staff of the Faculty of Chemistry received 2 prizes: T.S. Kharlamova was awarded the prize for High Achievements in Science for her monograph Design of Functional Materials: from Understanding of the Laws of Formation to Targeted Property Management; the prize for High Achievements in Education was awarded to the team of authors (L.P. Shilyaeva, N.N. Sudakova, V.N. Belousova, T.S. Minakova, G.V. Mamontov) for study guide Practical Work in Colloidal Chemistry. In 2018, G.V. Mamontov received the price for Higher Achievements in Science for young scientists for his cycle of studies Design of New High-Performance Catalysts to Protect the Environment and Produce Valuable Organic Compounds.

Among the documents regulating the award of honorary titles and prizes (http://www.tsu.ru/university/sovets/Academic_Council/):

– Regulations on the title Visiting Professor of TSU;

– Regulations on the Awards at Tomsk State University (http://www.tsu.ru/university/sovets/Academic_Council/).

Clear, transparent and fair processes for staff recruitment and conditions of employment including candidates from overseas educational institutions, appointment, promotion, dismissal, and suspension from teaching due to poor competence

TSU has developed a series of Regulations determining the list of documents on competitive recruitment of the teaching staff (Regulation on the Procedure for Filling the Position of Academic Faculty in a Higher Educational Institution of the Russian Federation; Procedure for Competition on Filling the Position of Academic Faculty at TSU; Regulations of Election of a Head of the Department, etc. (http://www.tsu.ru/university/sovets/Academic_Council/).

Documents submitted for the competition reflect the performance indicators of pedagogical and scientific-pedagogical activities.

Annual individual plans reflect planning and completing particular types of work (teaching, research, project, curriculum and instruction, etc.). On the basis of reports on completion of individual plans employees are awarded financial incentives and offered to review and develop their position (Regulation on Remuneration of Employees at TSU http://www.tsu.ru/upload/medialibrary/fa6/Polojenie%20oplate%20truda%204.09.13.pdf).

Training, retraining, and advanced training courses, professional development of the teaching staff.

The TSU Institute of Distance Learning trains teaching staff in various subject areas (http://ido.tsu.ru).

According to the schedule of training courses, the teaching staff takes up advanced training courses, internships including those held at overseas universities within the academic mobility programme.

96% of the teaching staff have had advanced training for the last 3 years. They completed courses in language proficiency improvement, development of courses in Moodle, development of IEES and many others.

The Faculty of Chemistry organises its own advanced training courses New Scientific Trends in Modern Chemistry and Their Application, Thermal Analysis as a Method for Studying Substances and Physicochemical Processes https://dpo.tsu.ru/program.php?n=2643, Surface Research Methods https://dpo.tsu.ru/program.php?n=2640 within programmes of professional retraining Methods and Technologies for Forming Interphase Boundaries and Nanostructured Nonmetallic Multifunctional Coatings https://dpo.tsu.ru/program.php?n=924, Modern Methods of Sample Preparation, Analysis and Research of Multicomponent Systems of Various Origin and Composition https://dpo.tsu.ru/program.php?n=1167.

Conclusions on Standard 5:

Strengths:

1. Research activity and involvement of the teaching staff in professional and scientific projects including international ensures high level of student training.
2. TSU effective advanced training system.
3. High motivation of the teaching staff in advanced training.

Aspects to be improved:

1. Inclusion of partners from the real sector of economy in preparation and completion of grant bids.
2. Increase in the number of overseas lecturers.

2.6 Standard 6. Learning resources and student support

Learning resources meeting the requirements of the syllabi (modern tools, equipment, computers, rooms, laboratories)

Learning resources for all kinds of educational activities in the cluster of study programmes are presented in Annex 13 and includes:

- multimedia rooms for lectures and seminars equipped with projectors, audio system, Internet access;
- computer classes;
- training chemical laboratories;
- research laboratories;
- self-study rooms.

The TSU Research Library offers computer classes for collective use and 24/7 Information centre.

Training (introductory) internship is based on the departments of the Faculty of Chemistry and is completely provided with necessary learning resources. 20 support staff specialists work in the laboratories.

Accessible modern library and information resources including those for self-study and research

The TSU Research Library (http://lib.tsu.ru) implements a strategy of accessible information. There are open access working places in all the halls containing various types of documents.

A reading hall of the information centre has been transformed into a research hall providing students with open space or isolated working places. The hall offers equipped co-working zones. All the premises can be booked online at any time.

The International Resource Centre provides access to topical printed and electronic information resources in foreign languages (English and German) and high quality service of international students and teachers.

The library funds are replenished and updated annually at the request of the teaching staff of the Faculty of Chemistry.

The automated information system Timetable provides information about classes and is available on the TSU website http://schedule.tsu.ru/.

The distance learning system Moodle is widely used in the learning process. It develops, stores, and delivers content (https://moodle.tsu.ru/). Developed resources (lectures, practical classes, assessment tools) in the system are available to subscribed students.

Infrastructure providing groups of various abilities and age with access to high quality education and contributing to the development of social and educational component of the learning process

Social and educational work at the university is organised by the Department of Social and Youth Policy, which includes:

- Student Trade Union (http://studprofcom.tsu.ru/);
- Employees' Trade Union (http://profcom.tsu.ru/);
- Joint Council of Students.

Students may choose a student community (music, theatre, sport, etc.) http://abiturient.tsu.ru/relax/.

Student communities engage and unite initiative students creating and carrying out special projects, events, PR-actions, workshops.

Deputy Dean for Social Services Mikhail V. Anischenko deals with educational work at the Faculty.

The TSU Psychological Service provides social and mental support (http://ps.tsu.ru/), helpline works, it is possible to address questions to the psychologist ps@mail.tsu.ru.

The TSU recreation centre is located near Kireevsk (Kozhevnikovo district, Tomsk region) and is intended for organising and holding cultural events, strengthening health, improving sport skills of the university teams.

Feedback on conditions and organisation of the learning process

Various university units arrange student feedback system. Questionnaire is one of the most effective methods. The results of the questionnaire are available in Annex 6.

Feedback on operational issues of the organisation of the learning process is carried out through a community in the social network (https://vk.com/hf_tsu).

Programme management uses results of quality assessments in timely adjustment of the programme.

Access to information about academic mobility and its support system

The Center for Academic Mobility of TSU (https://vk.com/club73824070) organises work to ensure international and domestic academic mobility, advisory support for undergraduate and postgraduate students, and employees of TSU.

The Center for Joint Educational Programmes (www.cjiap.tsu.ru) enables internationalisation of higher education at TSU, supports the development and implementation of joint double-degree study programmes, inclusive education, as well as increases the mobility of TSU for undergraduate and postgraduate students and teachers.

The website of the Faculty of Chemistry and the website of Translational Chemical and Biomedical Technologies programme highlight current and useful information about internships, workshops, and volunteer projects for students http://chem.tsu.ru/node/4426; http://chem.tsu.ru/node/4427; http://chem.tsu.ru/node/4403. Information is duplicated in groups in social networks (https://vk.com/hf_tsu).

Information about internships and international conferences is published on the website of the TSU Youth Center (http://www.tsu.ru/science/sciactivity/centr.php).

Information about academic mobility opportunities is also communicated to students through the programme head and manager in social networks and at personal consultations.

Conclusions on Standard 6:

Strengths:

1. TSU infrastructure ensures high quality education.
2. Developed learning resources of the Faculty of Chemistry including modern physicochemical equipment for efficient research.

Aspects to be improved:

1. Feedback system to improve the learning process in terms of effective adjustment measures and accessibility of information about changes in the programme.

2.7 Standard 7. Information management

Comprehensive and reliable data on the study programme (content, learning outcomes, qualification, level of teaching, teaching and assessment methods, opportunities)

Information about the content of the study programmes is available on the TSU website (section Education http://www.tsu.ru/education/), pages Bachelor's, Specialist's, Master's, and include:

- description of the study programme;
- curriculum and academic calendar;
- abstracts of the syllabi of the disciplines;
- syllabi of practices.

Information about the programmes, as well as information about teachers, assessment and learning outcomes is provided on the Faculty of Chemistry website; Translational Chemical and Biomedical Technologies website (http://ltcmb.tsu.ru/study/magisterskaya-programma/), section Main Documents; in social networking site VKontakte, in Moodle http://moodle.tsu.ru; TSU corporate account (https://accounts.tsu.ru/).

The Faculty of Chemistry publishes relevant information related to educational, research, sports, social, and cultural activities on the main site and in social networks.

Publication of unbiased data on demand on graduates and their employment.

The Employment and Career Service (http://www.cstv.tsu.ru/) conducts regular studies to assess the labour market needs for highly qualified specialists and effectiveness of employment of graduates.

The Service observes local and regional career and employment websites and publishes vacancies for all categories of people including people with disabilities. The overview includes vacancies for both young specialists and students who want to part-time.

The Service holds workshops involving employers who help students and graduates to receive recommendations on employment, get familiarised with requirements for specialists in a particular field and set of expected knowledge, skills, and personality traits.

In order to create a single community of TSU graduates for the intensive development of partnerships among them, formation and preservation of the unity of values and interests, the TSU Alumni Association was set up (http://alumni.tsu.ru/).

Unified information system, its effectiveness, degree of implementation of IT in management of the study programme

To organise and manage the learning process, TSU electronic information and educational environment is used. The main components:

- TSU website and faculties websites: http://www.tsu.ru/education/faculties/hf.php
- Website and Servicies TSU Research Library: http://lib.tsu.ru/ru
- TSU schedule: http://schedule.tsu.ru/
- Database «Results of Scientific Research»: http://portal.tsu.ru/public/classic/home
- E-learning system Moodle: https://moodle.tsu.ru/
- Corporate accounts of students and employees of TSU: https://accounts.tsu.ru
    - Corporate accounts of TSU employees. Employees: https://persona.tsu.ru/
    - TSU Corporate Social Network. Profiles: http://profiles.tsu.ru/
    - TSU Corporate Messaging Service: http://messenger.tsu.ru/
    - TSU Corporate News.News: http://feed.tsu.ru/
- Automated information system – AIS Applicant
- Automated information system – AIS Student

– 1C: Enterprise
– Information system Flamingo: http://flamingo.tsu.ru

Information infrastructure of the TSU Research Library provides access to:

– remote and local databases of scientific and educational resources. Academic faculty widely uses databases Scopus, Web of Science, e-Library, Springer resources, Elsevier journals, Oxford University Press, East View, Polpred, JSTOR;
– e-library (69,906 documents). Since 2016, collection of dissertations has been formed.
– e-catalogue containing 563,520 references; 834,302 copies).

Students and teaching staff use information analytical systems Student, Timetable (http://schedule.tsu.ru/), and Persona to organise and manage the learning process.

Automated information system Persona contains information about each TSU employee. The teaching staff can see a profile containing indicators of educational, scientific, methodological, research, project, and other activities. The data are used in calculating the workload and conducting competitive procedures.

e-learning system Moodle is used in the learning process https://moodle.tsu.ru/.

Information system Flamingo (http://flamingo.tsu.ru/) keeps track of student individual achievements.

Other types of the university activities are managed through 1C: Enterprise.

Conclusions on Standard 7:

Strengths:

1. Complete and reliable information about study programmes is available to applicants and students.
2. TSU information system corresponds to the institution's objectives.

Aspects to be improved:

1. Work with graduates, use of the Faculty website resources to support interaction.

2.8 Standard 8. Public information

Effective use of the official website of the educational institution for improving the quality of the study programmes.

First of all, the university website directs attention of all interested categories of people to the areas of the university activity.

News blocks post relevant information on the activities of each structural unit focusing on the best educational, research, innovative practices of students, teachers, and researchers. Information on the involvement of labour market specialists in the study programme, student achievements, successful graduate career that directly affects the quality of the programme.

The TSU website and the website of the Faculty of Chemistry cover information on events held by the Faculty of Chemistry: international and national conferences, contests, competitions, public lectures, workshops, etc.

Publication of complete and reliable information about the study programme and its achievements on the website of the institution and in mass media

Sites of the university departments and the Faculty of Chemistry post relevant, reliable information about the programmes and their achievements.

The website for prospective students Applicant (http://abiturient.tsu.ru) contains information about recruitment, regional, all-Russian, international events, results and achievements of schoolchildren.

New structure makes the website user-friendly and interactive.

Information on sites is accessible to visually impaired users.

In addition to the official publication on the Internet pages, TSU uses internal advertising and information resources such as newspaper AlmaMater, spreads advertising brochures with information about the Faculty and study programmes, and presents the programmes at various national and international forums and conferences.

Publication of unbiased data on demand on graduates and their employment

The TSU Employment and Career Service annually publishes the results of graduate employment according to the monitoring data of the Ministry of Education and Science of the Russian Federation jointly with the Pension Fund of Russia http://www.cstv.tsu.ru/?id=mon2.

Applications for graduates are published as vacancies on the site http://www.cstv.tsu.ru/?id=3

Integration with the environment, means of interaction between the institution and professional associations and other organisations including international

The strategy to improve relations with professional community is carried out by joint events (round tables, conferences, research seminars), which are held with the participation of colleagues from research and educational organisations in Tomsk and Tomsk Region, and other regions of Russia and abroad.

Conclusions on Standard 8:

Strengths:

1. Complete information about the programme on the TSU website and website of the Faculty of Chemistry.

2. Public information about the study programme through interaction of the teaching staff of the departments with educational and professional institutions.

Aspects to be improved:

1. More active use of the university resources to promote the programme abroad.

2.9 Standard 9. On-going monitoring and periodic review of programmes

Regulations on monitoring, periodic assessment, and review of study programmes

Review of the content of the study programmes is carried out, firstly, in order to bring them into compliance with the requirements of the Federal State Educational Standards / Independently Established Educational Standards of TSU and requirements of professional standards, and secondly, in order to take into account, the latest scientific achievements (once every 1-2 years). Teachers of the disciplines are responsible for making changes in the syllabi of the disciplines. Changes in the assessment tools, curriculum, content of the study programmes, and other organisational documents are carried out by the Head of the study programme with the agreement of the administration of the Faculty of Chemistry and the TSU Academic Division.

Mechanisms for receiving feedback from students, employers, profile ministries and authorities (key employment partners) while monitoring and assessing the quality of the study programmes

Mechanisms for receiving feedback from stakeholders are specified in the study programmes. Moreover, some disciplines have been developed in collaboration with prospective employers who are part-time teachers at the Faculty of Chemistry.

Effective procedures of monitoring and assessment of the study programme (improvement of the study programmes)

Since 1998, the Master's Programme in Chemistry has experienced numerous changes following interests of the Faculty and employers' request. 5 separate programmes in 2006, 8 in 2009, 10 in 2012 were united in one study programme Fundamental and Applied Chemistry of Substances and Materials in 2016 and separate programme Translational Chemical and Biomedical Technologies.

Curricula for the study programmes Chemistry (Bachelor's) and Fundamental and Applied Chemistry (Specialist's) are created so that students are able to transfer from one programme to another regarding their scientific and professional interests during first 3 years without academic differences.

Conclusions on Standard 9:

Strengths:

1. Continuous update of the study programmes, curriculum and instruction, organisational documents in accordance with the internal regulations.

Aspects to be improved:

1. Wider involvement of employers in correction of the content of the programme.

2.10 Standard 10. Cyclical external quality assurance

Periodic external assessment of the study programme

In 2017, the study programmes successfully passed state accreditation.

Periodically employers take part in independent assessment. They assess graduates' professional competencies being members of the State Examination Board, writing reviews on Bachelor's theses and the study programme, etc.

Victories and prizes of teachers and students in competitions in various activities confirm professionalism and development of personal qualities of contestants and serve as an example of an independent assessment by the professional community.

Successful employment of graduates in profile (p. 2.4) and positive feedback from employers also serve as an indicator of the positive external assessment of the programme.

Corrective actions based on the results of external expertise of the study programmes

External assessment by the experts of the Ministry of Education and Science of the Russian Federation did not reveal the need for correction of the study programme. The Federal Service for Supervision in Education and Science did not identify disadvantages and violations in organisation of the learning process in 2018.

Taking into account results of previous procedures in further external procedures.

Members of the Board confirm practical orientation and feasibility of the development of theses topics. Theses topics are annually adjusted because of new projects and grants carried out by students and graduates at the Faculty of Chemistry.

Conclusions on Standard 10:

Strengths:

1. Programmes are accredited by the Ministry of Education and Science of the Russian Federation.

Aspects to be improved:

1. External assessment of the quality of the programme independently from the Ministry of Education and Science of the Russian Federation.

III CONCLUSIONS

Demand on the clusters of the study programmes is confirmed by:

– successful employment of the graduates upon graduation;

– close collaboration with graduates of the Faculty and heads of enterprises interested in the Faculty graduates.

The content of the programme is regularly updated in view of the market demand and new trends in chemical science.

Indicators of direct assessment of the programmes are the results of internal monitoring organised at different levels (university, Faculty). Analysis of the monitoring results on assessing students' satisfaction with the quality of education allows us to conclude that 90% of the surveyed (on average for all study programmes in the cluster) are fully satisfied with the choice of the study programmes and the learning conditions.

The acquisition of professional competencies is accompanied by formation of students' portfolio that reflect their achievements: publications of scientific articles, presentations at seminars, scientific conferences and forums of various levels, victories in contests, etc.

Both the Faculty and the university support the career of graduates and assess the achievements of the goals of the study programmes.

Qualifications of the teaching staff confirm the quality of the programmes. Leading employees from academic institutes of the Siberian Branch of the Russian Academy of Science, Tomsk universities, Heidelberg University (Germany), the University of Münster (Geramany), Leiden University (The Netherlands), and ParisTechk (France) are involved in the learning process.

The programmes are carried out using lecture theatres and computer classes equipped with modern computational machines and necessary software, specialised chemical laboratories with modern equipment allowing for solving both training and scientific problems.

Theses topics of both fundamental and applied nature aim to solve topical tasks in chemistry and are highly assessed by the State Examination Board including employers.

Depending on a thesis topic students can do their research and have on-site internship at partner enterprises (NIOST, Institute of Petroleum Chemistry, Institute of Catalysis).

Diversity of the university units provides students with a wide range of services that help them to develop professional and personal qualities in view of their individual features.

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