European Chemistry Thematic Network Association

Site Visit Report

For the application for the

Chemistry Euromaster® ® LABEL

of the

Samara State Technical University

for the study programme

Energy and resource saving processes in Chemical technology, Petrochemistry and Biotechnology

(M.Sc.)

Visit date:
12-13 of April

The site visit was carried out partly online through the ZOOM platform. The audit was organized jointly with the Russian accreditation agency AKKORK, the Russian members of the audit team were directly at the university.

Assessment Team

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Anna Kurbatova
Ph.D. Biological Sciences (specialty "Ecology"), Associate Professor of the Department of Environmental Monitoring and Forecasting of the Environmental Faculty of the RUDN University of Russia; International expert in the field of ecology; expert-analyst in the field of ecology at Gazprom (representative of the academic community).

Alyona Basamykina
Head of the technical department of Areal Engineering (the company is engaged in the design of treatment facilities and the development of innovative technologies in the field of wastewater treatment and waste processing) (representative of the employers' community).

Oleg Korovin
4th year student of the Bachelor's programme "Energy and resource saving processes in Chemical technology, Petrochemistry and Biotechnology" of the RUDN University of Russia (expert from the student community).

Background of the visit

History of the Institution

SamSTU is a large scientific and educational center of the Povolzhie region, which provides training for specialists for the Energy, Oil and Gas, Chemical and Petrochemical, Engineering, Transport, Food, Defense industries, Information technology, Instrument making, Automation and Control in technical systems, Materials science and Metallurgy, Biotechnology, Industrial ecology.

The university was founded in 1910. Samara provincial assembly unanimously decided to petition the government for the opening of the Polytechnic Institute in Samara. In the Samara district council, representatives of the Ufa, Orenburg provinces and the Tashkent region unanimously recognized that Samara is more suitable than other cities for the establishment of a polytechnical institute.

Mechanical, energy and chemical-technological institutes were open in Polytechnic Institute in Samara in 1930.

In 1935 Polytechnic Institute in Samara was transformed in Kuibyshev Industrial Institute named after V.V. Kuibyshev. In 1980 according to the Decree of the USSR Supreme Soviet Presidium the Kuibyshev Polytechnic Institute was awarded the Order of the Labor Red Banner. In 1992 Kuibyshev Polytechnic Institute was transformed in Samara State Technical University (SamSTU).

In 2016 SamSTU has become one of the 11 core regional universities of the Russian Federation. The new status of the University and the expansion of its communication needs have set new challenges. It was a new corporate identity of the University, which reflects the vectors of development of the Flagship University and its values.

Today the list of the main professional educational programs of SamSTU includes programs of all levels of higher education, 24 enlarged groups of training fields. Training of highly qualified personnel in postgraduate studies is carried out in 21 directions. The university has 7 dissertation councils in 17 specialties.

Statistical data

Master programme Energy and resource saving processes in Chemical technology, Petrochemistry and Biotechnology is being implemented at the Chair of Chemical Technology and Industrial Ecology of the Institute of Oil and Gas Technologies.

Total number of students at the university for the academic year 2020-2021
17 009 students

Distribution

Level	Number of students	%
Bachelor students	12 368	72,6
Specialties students	2 207	13,0
Master students	2 067	12,2
Postgraduate students	367	2,2

Structure

4 Institutes
11 Faculties
68 Chairs
5 Research and project institutes

28 Scientific and engineering centres
17 Educational buildings

Assessment criteria

1. Judging the Quality of the programme: "Fitness for Purpose"

The study program is developed based on the competency model and the use of learning outcomes formulated using Bloom's Toxonomy.

As a result of the study program mastering, students acquire skills and abilities in the field of Energy and Resource saving in Chemical technology, Petrochemistry and Biotechnology:

1. Solve professional tasks of research activities.
2. Make decisions in the framework of production and technological activities.
3. Carry out organizational and management activities.
4. Implement project activities.
5. Carry out pedagogical activities.

These competencies are developed taking into account specific professional activities in the field of Energy and resource saving processes.

The structure of the program ensures the acquisition of the Chemistry-related cognitive abilities and professional competencies. The presence of theoretical, practical (in significant ratio), and research elements ensures it.

The most of the courses contain lecture classes, laboratory or class room practical training, preparation of presentations and reports and independent study parts. The compulsory courses cover all main disciplines of Chemistry at an advanced level, while the choice of (sub) modules enhances the knowledge in one field. There are two research projects and a Thesis paper.

Comparing this structure to the Main tasks the requirement are fulfilled. Furthermore, the local regulations are rather strict in Ethics, e.g. the results obtained in the research projects should be included into the Thesis only with references to the literary sources.

The area of professional activity of graduates of the Master's program includes scientific foundations, the creation and implementation of environmentally friendly technologies in the production of basic inorganic substances, products of basic and fine organic synthesis, polymer materials, products of oil, gas and solid fuels, microbiological synthesis, medicines and food products, methods of handling industrial and household waste and secondary raw materials.

Graduates in this profile of training can implement industrial and technological, research, development activities in the field of creation and operation of energy and resource-saving, environmentally friendly technologies, as well as the development of methods for environmental protection engineering and handling industrial and household waste.

The assessment team concluded that the presentation of the results of the study program and modules in a separate document (The Module Handbook) will improve the process of students understanding of the educational process and the formation of an individual learning plan. At the same time, the purposes of the program and learning outcomes should be harmonized with the 7th level of the European Qualifications Framework.

2. Structure

The total credits of the study program – 122 ECTS.

The study program is detailed in self-evaluation report. The program provides 4 modules / 37 courses.

The minimum number for the elective part of the program is 14 credits. A choice of 3 out of 6 elective courses is offered, also there is a choice of optional disciplines. An individual learning path is implemented within the framework of industrial practice: research work.

	Title of course	ECTS
	1 -semester	
	Foreign language in professional field	2

	Philosophical basics of science and technology	2
	Thermodynamic basics of resource saving	4
	Development and operation of equipment for processing and disposal of industrial and solid household waste	4
	Innovation workshop (development workshop)	1
	Industrial environmental control	2
	Assessment and regulation of environmental quality	2
	Basics of planning and mathematical processing of experimental results	3
	Basics of multidimensional data analysis	3
	Industrial practice: research	9
	2 -semester	
	Pedagogy and Psychology	2
	Economics and Management of Chemicals, Petrochemical and Biological industries	2
	Methods of optimization and organization of energy- and resource-saving chemical-technological systems	4
	Modelling of technological and natural systems	2
	Environmental safety management of production	2
	Resource saving and environmental protection in oil production, refining, petrochemistry, and power engineering	4
	Design and operation of gas emission treatment equipment	2
	Innovation workshop (development workshop)	1
	Professional software products	3
	Methods and means of environmental information processing	3
	Waste management logistics	2
	Recycling Basics	
	Self-organization of the professional development	2
	Educational practice: practice for obtaining primary vocational skills and abilities	3
	Industrial practice: practice to obtain professional skills and professional experience activities (including technological practice)	6
	Business foreign language	1
	3 -semester	
	Additional chapters of Mathematics. Systems analysis theory and decision making	3
	Surface phenomena and dispersed systems	2
	Resource saving and environmental protection in metallurgy, mechanical engineering and construction industry	4
	Design and operation of wastewater treatment equipment	4
	Innovation workshop (development workshop)	1
	Engineering entrepreneurship	2
	Recultivation of pits	2
	Treatment and disposal sewage sludge	2
	Production practice: teaching practice	9
	Theoretical and experimental research methods in Chemistry	1
	4 -semester	
	Master Thesis Production practice	27

	Industrial practice: research work	

The research projects might precede the Thesis work as introductory activities. Generally, one of the research projects is done on the same place and on a similar topic as the Thesis. Officially the Thesis is concentrated in one semester, but most of the students reported that they started their activity at least one semester earlier. We discussed it with the supervisors and they know their responsibility to announce a thesis topic that can be finished in this timeframe. Of course, the time limitation reduces the possibility to finalise and to publish the research till the graduation.

As an obligatory component of the master program students take the course Innovation Workshop (development workshop).

The study program provides for educational practice, pedagogical practice aimed at the introduction and implementation of team project work in accordance with the individual educational trajectory, industrial technological practice allocated in the summer for practical training at the facilities of industrial partners, industrial practice in the form of research work in a semester aimed at developing skills of independent work in the field of environmental protection.

54 credits were allocated for practical training and research.

Industrial practice: research - 9 credits

Educational practice: practice for obtaining primary vocational skills and abilities -3 credits

Industrial practice: practice to obtain professional skills and professional experience activities (including technological practice) – 6 credits

Production practice: teaching practice – 9 credits

Production practice – 3 credits

Industrial practice: research work – 24 credits

The expert team believes that courses could be extended beyond 5 credits. However, this is due to the stipulations of the Federal educational standard.

3. Language

The main language of lectures and academic advising is Russian. Most of the textbooks and all student presentations and papers are written in Russian. The experts did not confirm the communication methods in English for both students and teachers. According to experts, the lack of communication in English is a serious limitation of the program. The lack of an advanced multilingual environment is the reason for the lack of foreign professors and students from foreign countries.

4. ECTS and Student Workload

The Student workload was estimated based on the requirement of 60 ECTS per year, implied by the law. This leads to approximately 36 hours (including contact hours and independent training) corresponding to 1 ECTS credit.

The academic year consists of the autumn semester and the spring semester. Each semester extends 17 weeks.

The academic load is 52 hours per week on average, including independent work and electives, of which 30-32 hours are classes (in accordance with the educational standard, the volume of contact work should be at least 60% of the total time for the implementation of disciplines / modules).

One credit corresponds to 36 hours, including all possible types of classes, including independent preparation for tests and exams, the time for which is allocated in proportion to the

study load. The Student workload is determined in accordance with the Federal educational standard. As part of an internal independent assessment of the quality of education, educational programs are monitored, including an annual survey of students in order to identify their satisfaction with education quality, with the structure and content of the educational program as well. Based on the results of monitoring and survey, the Head of the educational program may decide to redistribute hours for various activities within the discipline.

5. Modules and Mobility of students and staff

Academic mobility is available for 1-2 year students. At the same time, in the interviews with teachers and students, the facts of academic mobility were not confirmed.

6. Methods of Teaching and Learning

Training in small groups is used in laboratory work in practical disciplines. Classes devoted to problems solving and discussion of real professional problems, to one extent or another, are implemented in all disciplines of the program, as well as within the framework of project (research) work of students.

SamSTU uses e-learning technology, distance learning systems. Access to educational electronic resources of SamSTU is open from any computer with Internet access. History, Jurisprudence and Philosophy are implemented in a mixed format: a course of lectures is provided in an online format through the SamSTU distance learning system based on the Moodle platform. For online testing of the courses, a fund of tests and the automated computer testing system of SamSTU are used.

At the Chair of Chemical Technology and Industrial Ecology since 2018 until now, activities on the topic " Development of technology for remediation of the geological environment in the area of oil refineries and linear structures" are being implemented. The industrial partner is NK Refinery. Master students took and / or are taking part in the team project. The project activity of students within the framework of this topic is a type of educational activity. It is aimed at the formation and development of individual and team competencies in the process of solving practical problems of an industrial partner as part of the implementation of the life cycle of an interdisciplinary project. It is based on the integration of knowledge and experience in various subject areas.

In the course of the implementation of the work of interdisciplinary teams, students acquired competencies related to teamwork, to the development and reading of technical, scientific and legal documentation on the object of research, setting and conducting experimental and laboratory work, working with modern software in the professional field and related fields. Students have an individual trajectory of training and during the implementation they have mastered additional disciplines in addition to the main curriculum, such as: dynamic volcanology, the basics of project activities, hydrogeology, methods of processing multidimensional data, information services in engineering management, construction geology, practice-oriented project. This approach makes it possible to train qualified personnel both in the field of the main curriculum and in related fields, as well as those who have the ability to solve real production problems of enterprises in the region and the country as a whole, to interact with the authorities on the research topic, as well as to present and defend their development solutions at scientific and technical events of various levels.

7. The resources available for this programme (laboratories, library, ICT, advanced instrumentation)

For the implementation of the study program, classrooms are used for conducting lecture, seminar-type classes, course design, group and individual consultations, monitoring and intermediate certification, rooms for independent work and rooms for storage and preventive

maintenance of educational equipment. The premises are equipped with specialized furniture, laboratory equipment, technical means, demonstration equipment, and visual aids.

The premises for independent work of students are fitted with computer equipment with Internet and are provided with access to the electronic information and educational environment of the organization.

Research work is organized in:

- Laboratory complex "Chemical technology and industrial ecology".
- Solid Waste Processing Laboratory.
- Laboratory "General Chemical Technology".

The reviewers' team points out that the equipment of laboratories should be constantly updated, in particular, it is necessary to purchase modern equipment and software for environmental monitoring through digital tools.

8. Laboratory safety

Both the theoretically and the equipment supported laboratory safety became key components in the trainings of the Teaching staff. In the case of MSc students, it is necessary to sign a labour safety instruction before starting the semester. The mentioned hierarchy of supervisor > MSc student provides a practical transfer of knowledge on labour safety. Experts have found in all practical training rooms a responsible person; no one works alone in closed invisible area. The ventilation is correct, it was impossible to smell the chemicals in most of the cases. The number of the fume hoods is sufficient.

9. Assessment procedures and performance criteria

Exams (credits) are held at the end of each semester in accordance with the curriculum.

Oral and written examinations are used. In professional disciplines, oral examinations are predominantly used. Credits can be set based on the results of the student's work in the semester. In the disciplines of the general education and basic module (1 - 2 courses), it is envisaged to use an accumulative system to assess learning outcomes; when conducting exams (tests), the results of the current monitoring of progress in the semester are taken into account.

When conducting an exam, depending on the scope of the discipline and the number of students, additional 1-2 teachers may be involved as examiners.

For oral exams, the minimum preparation time is 30 minutes, the exam time, regardless of the form (oral / written), is not more than 4 hours.

When passing the exam, the student is provided with feedback in the form of correct answers.

Written exams are conducted both in the form of tests and written tests, the approval of the assessment lies in the teacher's area of responsibility.

The work program of each discipline contains a list of questions for the exam (pass/fail test), examples of exam papers, information on the form of the exam (pass/fail test), the criteria for grading.

The test or exam can be conducted in face-to-face format or using distance technologies (in this case, the identification of the student's personality is provided).

Anonymous assessment is carried out in the case of taking an exam (test) in the form of automated computer testing.

Examination commissions are created for the second retake of the exam (pass/fail test), in the event of an unsatisfactory assessment based on the results of the first retake of the exam (pass/fail test).

Term papers are evaluated according to the results of defense, for which a commission of leading teachers is created at the graduate chair.

The experts noted the limited number of evaluation forms for learning outcomes assessment.

Criteria for evaluating Master thesis: scientific novelty, quality of analysis and solution of the assigned tasks, volume and quality of experimental and / or theoretical work, use of modern mathematical and computer software, computer technologies in work, defense of the main provisions arising from Master thesis results, quality of work design, scientific literacy of the Master thesis text, originality of the work.

Master's theses are subject to peer review. The defense of the FQW takes place before a commission consisting of representatives of employers who assess the qualifications and competencies of students based on their professional experience.

10. Grading

The university uses the ECTS. The point-letter system for assessing the academic achievements of students is not used.

11. The Diploma Supplement

The Diploma Supplement is drawn up at the individual request of any university graduate on the letterhead of the Spanish company "Signe, S.A." In Russian and English, the application describes the level, status, content and results of the education received. In English, the document contains additional information about the holder of the diploma and his/her qualifications, as well as the content and learning outcomes in credits of the European Credit transfer and Accumulation System (ECTS).

The minimum document processing time is 10 working days. In case of a large number of requests, it can be extended up to 30 working days.

12. Quality Assurance

Internal quality assessment includes annual monitoring of educational programs (the quality of training of students and resource provision of educational activities), assessment of student satisfaction with the quality of education (educational program, organization of the educational process, conditions for extracurricular activities), assessment by students of the quality of teaching in individual disciplines. The formation of data, including the results of the survey, is carried out in the AIS "University". Specialized subdivisions generalize the results, provide them to the university administration, heads of faculties (institutes), chairs, heads of educational programs in the local information network of the university.

Based on the results of monitoring and surveys, taking into account the key areas of modernization of the educational activities of SamSTU, changes are annually introduced into the program aimed at updating the content (excluding / introducing academic disciplines or their parts), reformatting educational activities. Since 2016, while maintaining the volume of fundamental training, the practical component has been strengthened: the module of project activities has been introduced and expanded (team project work, elements of entrepreneurial education).

13. Numbers of graduates in the past five academic years and forecast for the next years

Year	Admission results
2018	11
2019	9
2020	7

14. Employability of the graduates during recent years and expectations for the future

1. **2017/2018 academic year of graduation:**
   - Students working in the field of training in the region: 100%
2. **2018/2019 academic year of graduation:**
   - Students working in the field of training in the region: 100 %
3. **2019/2020 academic year:**
   - Students working in the field of training in the region: 66,6%
   - Students working in the field of training outside the region: 0%
   - Not employed in the field of training: 33,4% (the reason is the launch of one's own business).

15. Ethical concern

The ethics code is regularized at university level. The code is available for the students and it is strictly taken into account. The Thesis is checked for correct referring and plagiarism. Fair citation is a requirement in Master theses implementation in accordance with generally accepted ethical and legal norms. Fulfillment of this requirement is reflected in the review of the academic advisor of the Master thesis which is based on the results of the Master thesis verification for the amount of borrowing, incl. identification of unauthorized borrowing.

In accordance with the Regulations of SamSTU on the procedure for State Final Certification, the advisor ensures that the student's FQW is submitted for verification in the "Anti-Plagiarism system. University" through the personal account of the advisor in the AIE, ensures timely transmission of the results of the examination of the thesis for the presence of borrowing to the student and upload of the thesis to the AIS. FQW checking for borrowings is carried out in accordance with the "Regulations on the use of software "Antiplagiat" for checking manuscripts and written works."

In accordance with this provision, the manuscripts of dissertations and publications are also checked.

16. Are electronic media used for teaching, learning and/or assessment like EChem Test officially used in the CHEMISTRY EUROLABEL® programme?

The use of Moodle is used at the faculty. Both the staff and the students accept its use and apply it as a basic contact tool. EChemTest is not applied at the faculty; its use is not part of the program.

Any other comments / information

1. The Study program according to formal principles corresponds to the Standards of the European Thematic Network (engineering direction) and corresponds to the 7th level of the European Qualifications Framework.
2. The human and laboratory resources of the study program are sufficient to train sought-after specialists. An effective system of cooperation with employers has been created, they are actively involved in the development and implementation of the study program.
3. The program is characterized by a high demand for graduates, which is confirmed by a high level of employment. The initiatives of the university leadership for the development of technological entrepreneurship results in the fact that graduates start their own businesses.
4. The international component of the study program is insufficiently developed, foreign professors are not involved in lecturing, there are no examples of academic mobility of students and Teaching staff, there are no foreign students.

5. The university implements the practice of issuing the Diploma Supplement to students on request on a paid basis. The general practice of issuing free Diploma Supplements should be implemented.
6. For the more effective organization of an individual trajectory of master students training, it is advisable for the university to develop a Module Handbook describing available elective modules for the students to choose from.
7. EChemTests are not used.

Persons seen during the site visit and subjects discussed

1. Rector, Deans, Heads of Departments and Laboratories. Subjects discussed.

Discussion with representatives of the leadership of Samara State Technical University:

Subjects discussed: Educational and scientific position of Samara State Technical University in the region and in the Russian Federation, plans of the university, cooperation with other universities, academic institutes and industrial partners, position of the the Faculty of Chemistry and Technology (CTF) within the university, profile and development of the faculty in last years, research profile of the faculty, personnel development, equipment and facility situation, cost of new building construction, quality assurance in the faculty and the university, drop-out ratio, social aspects of studying science.

2. Meeting with Teaching staff

Subjects discussed: Curriculum; Teaching and Learning methods, reviews of the Teaching staff members on their courses (methods of teaching, schedule, curricula, assessment, advanced educational methods), research, consideration of the needs of the region, cooperation with foreign universities.

3. Discussion with those responsible for the programme

Subjects discussed: Degree profile, curriculum, items in self-evaluation report: chemical / technology profile of the program, employers involvement, qualification with a chemist / engineer degree, admission to the program, compliance of the qualification with the European Qualifications Framework, the aim and the main tasks of the program, skills, competencies and their relation to courses, ratio of practical courses, timing and prerequisites of Thesis, access of students to institutional facilities, academic year, trends in last years, PR activity of the institute, employability, safety regulations for Master students, database transparency.

4. Meeting with students.

Subjects discussed: Drop-out ratio, schedule of research projects and Thesis work, use of IT platform, information on PhD and employability, academic year, attitude towards Teaching staff, interaction of students and Teaching staff in case of problems and new proposals.

5. Meeting with graduates

Subjects discussed: Satisfaction with the program, applicability of the acquired skills and competencies, demand and employment, career prospects.

6. Meeting with employers and other social partners

Subjects discussed: The level of professional skills and competencies, satisfaction with graduates, cooperation with the Chair and faculty, career growth of graduates, the presence and prospects of the language competencies of graduates.