ASIIN Seal

Accreditation Report

Bachelor's Degree Programme
Applied Chemistry

Provided by
University of Shanghai for Science and Technology

Version: 22 March 2024

Table of Content

A About the Accreditation Process

Name of the degree programme (in original language)	(Official) English translation of the name	Labels applied for [1]	Previous accreditation (issuing agency, validity)	Involved Technical Committees (TC)[2]
应用化学	Applied Chemistry	ASIIN	-	09
Date of the contract: 15.07.2020 **Submission of the final version of the Self-Assessment Report:** 19.11.2021 **Date of the online audit:** 1. – 03.12.2021 **at: University of Shanghai for Science and Technology (USST), China**				
Peer panel: Prof. Dr. Veronika Hellwig, Technische Hochschule Lübeck - University of Applied Sciences Prof. Dr. Carla Vogt, Technical University Freiberg Dr. Xiangyun Kong, BASF China (desktop review) Pegi Pavletić, Ph.D. candidate in Chemical and Pharmaceutical Sciences and Biotechnology, University of Camerino, Italy				
Representative of the ASIIN headquarter: Rainer Arnold				
Responsible decision-making committee: ASIIN Accreditation Commission				
Criteria used: European Standards and Guidelines as of 15.05.2015 ASIIN General Criteria as of 28.03.2014				

[1] ASIIN Seal for degree programmes
[2] TC 09 – Chemistry, Pharmacy

Subject-Specific Criteria of Technical Committee 09 – Chemistry, Pharmacy as of 29.03.2019	

In order to facilitate the legibility of this document, only masculine noun forms will be used hereinafter. Any gender-specific terms used in this document apply to both women and men.

B Characteristics of the Degree Programmes

a) Name	Final degree (original/English translation)	b) Areas of Specialization	c) Corresponding level of the EQF[3]	d) Mode of Study	e) Double/Joint Degree	f) Duration	g) Credit points/unit	h) Intake rhythm & First time of offer
Applied Chemistry	Bachelor of Science		6	Full time	No	4 years	240 ECTS,	September / 2008

For the Bachelor's degree programme Applied Chemistry the University of Shanghai for Science and Technology (USST) has presented the following profile in its Self-Assessment Report:

"Applied chemistry is a discipline that cultivates talents with basic knowledge, theories, skills, relevant engineering and technical knowledge, and solid experimental skills in chemistry, scientific thinking and scientific experiment training in basic chemical research and applied basic research, who can be engaged in scientific research, teaching and management in colleges and universities, scientific research institutions, enterprises and other public institutions."

[3] EQF = The European Qualifications Framework for lifelong learning

C Peer Report for the ASIIN Seal

1. The Degree Programmes: Concept, content & implementation

Criterion 1.1 Objectives and learning outcomes of a degree programme (intended qualifications profile)

Evidence:

- Self-Assessment Report
- Module descriptions
- Study plan
- Webpage Department of Chemistry: https://mse.usst.edu.cn/
- Discussions during the audit

Preliminary assessment and analysis of the peers:
The peers refer to the Subject-Specific Criteria (SSC) of the Technical Committee 09 – Chemistry, Pharmacy as a basis for judging whether the intended learning outcomes of the Bachelor's degree programme Applied Chemistry as defined by the University of Shanghai for Science and Technology (USST) correspond with the competences as outlined by the SSC. They come to the following conclusions:

The purpose of the Bachelor's degree programme Chemistry is to train and educate graduates who not only understand fundamental chemical theories but also have the ability to apply their knowledge and skills to solve theoretical and practical problems in the fields of chemistry, pharmacy, new materials, and chemical analysis and testing.

Graduates should have a fundamental understanding of the core chemical areas (organic, inorganic, analytical, and physical chemistry) as well as a basic understanding of natural sciences and mathematics. In addition, they should be familiar with the underlying scientific methods and principles. Meanwhile, they should conduct training and internships in order to understand recent developments in chemistry and be acquainted with professional work. Moreover, graduates should be proficient in computer applications, English literature reading related to the specialty and English communication skills.

Additionally, graduates should understand major chemical concepts and be able to use laboratory techniques. They should also be trained in experimental methods in chemistry, be

aware of chemical hazards and how to prevent risks by applying appropriate safety tools, and have a sound knowledge of safety standards for preventing environmental problems. Moreover, graduates should be capable of using scientific literature and conducting scientific work and should be committed to excellence in their professional pursuits, with a sound background in both experimental and theoretical aspects of chemistry.

Besides these subject-related competences, graduates should also acquire oral and written communication skills, be able to work in groups, to draft reports, to give presentations, and to be prepared to enter professional life.

Graduates of the Bachelor's degree programme Applied Chemistry have several job opportunities; they can work in the chemical, pharmaceutical, mining or petrochemical industry, at universities as well as in research institutes or in the public administration.

The information provided in the Self-Assessment Report and the supplementary information received from the programme coordinators, clearly shows that discipline-related skills are accurately outlined and competences are defined for the Bachelor's level agreeing with the respective Subject-Specific Criteria (SSC) of the ASIIN Technical Committee.

For the award of the subject-specific ASIIN label, Bachelor's programmes must achieve learning outcomes that are divided into the categories "subject-specific competences" and "generic competences". The Subject-Specific Criteria (SSC) of ASIIN are the result of a regular assessment by the ASIIN Technical Committees, which summarise what is understood as good practice in higher education or demanded as future-oriented training quality in the labour market supported equally by academia and professional practice.

Based on the Self-Assessment Report and the discussions during the online audit, the peers see that graduates of the Bachelor's degree programme Applied Chemistry acquire the subject-specific competences defined in the SSC of the Technical Committee 09 – Chemistry, Pharmacy. Thus, chemistry-relevant mathematical and scientific basic knowledge as well as sound knowledge in the chemical core subjects Inorganic, Organic and Physical Chemistry as well as Analytical Chemistry are taught. Finally, students are enabled to do practical chemical work and learn how to handle chemicals independently and safely in laboratory works.

In the course of their studies, students should also acquire social skills, such as the ability to work in a team and to communicate with each other. In addition, they should be familiar with the implementation of projects and be prepared for entry into professional life in a company or scientific environment through sufficient practical relevance of the study programme. The auditors are convinced that the intended qualification profiles of the degree programme under review allows students to find positions reflecting their qualification.

The degree programme is designed to meet the particular needs of the local and the national labour market. The auditors consider objectives and learning outcomes of the degree programme appropriate for attaining the intended level of academic qualification.

The auditors hold the view that the objectives and intended learning outcomes of the Bachelor's degree programme Applied Chemistry as mentioned in the Self-Assessment Report are reasonable and the job perspectives are realistic. During the discussion with the auditors, the employers confirm that graduates from USST have very good theoretical and practical skills and are in general better qualified in comparison to graduates from other similar programmes in China.

In summary, the auditors are convinced that the intended qualification profile of the Bachelor's degree programme Applied Chemistry allows graduates to take up an occupation, which corresponds to their qualification. The peers judge the objectives and learning outcomes to be suitable to reflect the intended level of academic qualification (EQF 6) and to correspond with the ASIIN Subject-Specific-Criteria (SSC) of the Technical Committee 09 – Chemistry, Pharmacy.

Criterion 1.2 Name of the degree programme

Evidence:

- Self-Assessment Report

Preliminary assessment and analysis of the peers:
The auditors hold the opinion that the English translation and the original Chinese name of the Bachelor's degree programme Applied Chemistry corresponds with the intended aims and learning outcomes as well as the main course language (Chinese).

Criterion 1.3 Curriculum

Evidence:

- Self-Assessment Report
- Study plan
- Module descriptions
- Webpage Department of Chemistry: https://mse.usst.edu.cn/
- Discussions during the audit

Preliminary assessment and analysis of the peers:

Based on the intended learning outcomes of the Bachelor's programme Applied Chemistry, the curriculum is divided into nine competence fields:

1. Engineering Science Foundation and Technology (25 ECTS),
2. Foreign Language (12 ECTS)
3. Informatics (4 ECTS)
4. Professional Basics (55 ECTS)
5. Core Professional Courses (20 ECTS)
6. Professional Electives (14 ECTS)
7. General Courses (19 ECTS)
8. Experiments and Practice Courses (51 ECTS)
9. Undergraduate Graduation Project (40 ECTS)

The competence field of Engineering Science Foundation and Technology is designed to help students master the basic knowledge of mathematics and physics, deepen their understanding of engineering science, and improve their scientific accomplishment to solve practical problems in the application of science and technology.

The Informatics field is designed to enable students to have a certain degree of computer and information science and technology application capabilities, to lay a solid foundation for using computers and information technology. In the area of Foreign Language (English), students need to pass the National College English Test (CET-4) in order to obtaining the necessary English proficiency for professional communication and international cooperation.

Courses in the Professional Basics area are designed to help students mastering the basic subject specific methods and theories in chemistry, including inorganic chemistry, organic chemistry, analytical chemistry, and physical chemistry.

The purpose of the Core Professional courses is to enable students to acquire advanced professional knowledge after mastering fundamental chemical and technical knowledge.

Professional Electives should enable students to gain knowledge and skills in emerging and cutting-edge fields of applied chemistry. After mastering the core professional technology, students can deepen their professional knowledge and skills in their area of interest in the fields of biomedical chemistry and new material preparation. In total, 13 different electives are offered and students have to choose at least seven of them.

General Education courses aim at cultivating students' overall humanistic attitudes, social skills, and communicative competences. The specific requirements are as follows: 1) Master the basic humanities and social sciences, possess good humanistic qualities, and undertake professional, social and environmental responsibilities; 2) Train and exercise through various practical activities and team activities; 3) Be able to communicate effectively and adapt to different work environments and society. The general courses are not specifically designed for students of the Applied Chemistry programme but are compulsory for all undergraduate students at USST.

Experiments and laboratory work are designed to help students understanding and mastering the basic chemical synthesis processes, the basic operation and working principles of related test equipment, and cultivating their practical skills. This field focuses on cultivating students' experimental skills and engineering concepts, which should enable students understanding R&D and production processes, processing technologies, manufacturing methods and related equipment, in order to further verify and consolidate their theorectical knowledge and deepen the understanding in this field.

The Undergraduate Graduation Project requires students to conduct an internship, to complete a graduation project independently under the guidance of a supervisor, and to pass the graduation thesis defense successfully. Some students combine the internship and the graduation project.

Each semester lasts for 18 weeks, this includes 16 weeks for teaching classes and two examination weeks. In addition, there is a short summer term for some practical courses.

The peers cannot deduct from the submitted study plan, which electives the students have to take in which semester. For this reason, they suggest designing a study plan, which also includes the electives and makes the course schedule and selection more transparent. This study schedule should be published on the programme's webpage.

In summary, the peers see that the curriculum allows the students to achieve the intended learning outcomes.

Criterion 1.4 Admission requirements

Evidence:

- Self-Assessment Report
- Discussions during the audit

Preliminary assessment and analysis of the peers:

Admission to USST depends on the result of the unified admission examination of higher education institutions of the People's Republic of China or the unified admission examination held by various provinces and cities.

The peers understand from the documentation and the discussions during the audit, that the admission to Bachelor's degree programmes in China is centrally regulated and organized by the government. Graduates of high schools take the National College Entrance Exams (NCEE, Gaokao). Based on the results, students may choose from subjects at Universities distinguished in three categories (40 elite Universities in the highest level, 100 key provincial Universities – among those the USST – at second level and the rest in the third category of general Universities). Students apply with their results to those Universities they are eligible for and the Universities follow their own admission procedure. If students are declined from admission, although they fulfil the basic entry requirements, Universities have to explain why they were not admitted. The Gaokao is held annually throughout China in the first week of June and is of crucial importance for the professional future of Chinese people. The better the reputation of a university and field of study, the higher the score achieved in the Gaokao must be.

The full mark of college entrance score in Shanghai was 750 points in 2020, the minimum score of students from Shanghai admitted to USST was 538 points. The minimum score of students admitted to the Applied Chemistry programme was 541, the maximum was 629 points, and the average score was 568 points.

Before 2019, the student number admitted was about 50. However, since 2019, USST released an admission reform policy to recruit students by major categories, which means the students admitted will not have their own major in the first year. Therefore, in 2019, 161 was the sum of students majoring in mathematics, physics, and chemistry, but the exact number for each major was unknown until students entered the second year. All students chose their majors according to their own wishes, as a result, the student number decreased to 35. In 2020, USST reformed the admission policy again, allowing the Department of Chemistry to directly admitting 35 students.

During the audit, the peers learn that there were 42 applications for the Applied Chemistry programme last year and around 50 % of the students are female. Approximately 20 % of the students come from the Shanghai area, the rest comes from other areas in China and all of them live in dormitories.

The tuition fee for the Applied Chemistry programme is 5.000 RMB (695 €) per academic year; the amount is decided by the local government of Shanghai and its responsible office. However, approximately 30 % of the students receive a scholarship. In addition, student

loans are available and, according to the students, the tuition fee is not too high and it is considered affordable for most students.

In summary, the auditors find the terms of admission to be binding and transparent. They confirm that the admission requirements support the students in achieving the intended learning outcomes.

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

The peers confirm that USST has designed a study plan, which now includes the electives and makes transparent in which semester students should take what course. The updated study plan is published on the programme's webpage.

The peers consider criterion 1 to be fulfilled.

2. The Degree Programmes: Structures, methods and implementation

Criterion 2.1 Structure and modules

Evidence:

- Self-Assessment Report
- Study plan
- Module descriptions
- Webpage Department of Chemistry: https://mse.usst.edu.cn/
- Discussions during the audit

Preliminary assessment and analysis of the peers:

The Bachelor's degree programme Chemistry is offered by the Department of Chemistry, which is part of the School of Materials and Chemistry of USST.

The curriculum consists of nine different areas and covers a total of 240 ECTS points.

1) Engineering Science Foundation and Technology (25 ECTS)

Learning objectives: to help students master basic knowledge of natural sciences such as mathematics and physics, deepen their understanding of engineering science and improve

their scientific literacy; to help students solve practical problems in the application of science and technology, and lay a foundation for learning basic chemistry courses.

General requirements: be able to use the basic theoretical knowledge of natural sciences to abstract and condense scientific issues and analyse them from the actual engineering practice.

Corresponding courses: Advanced Mathematics A (1), Advanced Mathematics A (2), Linear Algebra, Probability and Statistics B, College Physics, and Engineering Drawing.

2) Foreign Language (12 ECTS)

Learning objectives: to cultivate the capabilities of cross-cultural communication and international cooperation to better adapt to society and internationalization.

General requirements: master a foreign language, pass the National University Foreign Language CET-4; have the ability to read professional literatures and communicate in the foreign language professionally.

Corresponding courses: College English (1), College English (2), Interactive Practical English, Interactive Comprehensive English, Academic English Reading and Writing, Academic English Listening and Speaking.

3) Informatics (4 ECTS)

Learning objectives: to master basic knowledge of information technology and computer science to lay a foundation for utilizing computer programming and software to solve engineering problems.

General requirements: be able to use computer and information technology to solve practical problems proficiently in the fields of science and technology related to the learnt program.

Corresponding courses: Information Technology and Program Design and Practice.

4) Professional Basics (55 ECTS)

Learning objectives: to help students have a wide range of engineering and professional basic knowledge to lay a solid foundation for subsequent learning of Applied Chemistry courses.

General requirements: master the fundamental knowledge and theories of chemistry systematically, possess solid basic theoretical knowledge and experimental skills related to inorganic chemistry, analytical chemistry, organic chemistry, physical chemistry, instrumental analysis, chemical engineering principles, polymer chemistry, material chemistry,

spectral analysis, structural chemistry, fine chemicals etc. Understand the theoretical frontiers and application prospects of chemistry, and lay the foundation for studying professional courses.

Corresponding courses: Inorganic Chemistry (bilingual) (1), Inorganic Chemistry (bilingual) (2), Organic Chemistry (1), Organic Chemistry (2), Analytical Chemistry (bilingual), Biochemistry, Instrumental Analysis, Physical Chemistry (1) and Physical Chemistry (1), Principles of Chemical Engineering and Polymer Chemistry.

5) Core Professional Courses (20 ECTS)

Learning objectives: To help students master relatively solid and comprehensive professional basic knowledge.

General requirements: Focus on cultivating core competencies in applied chemistry based on cultivating high scientific and cultural qualities of students.

Corresponding courses: Structural Chemistry, Spectrum Analysis, Fine Chemicals Chemistry, Materials Chemistry, Organic Synthesis, Medicinal Chemistry, and the Safety Techniques of Chemical Laboratory.

6) Professional Electives (14 ECTS)

Learning objectives: To help students have professional knowledge and skills in the emerging and cutting-edge fields of applied chemistry.

General requirements: Master the cross-fields and related knowledge involved in applied chemistry, and expand the professional application capabilities of students.

This part is an elective competence field, where students can choose the corresponding courses based on their personal interests and development. Students are required to take 14 ECTS of electives based on their personal interests and can chose at least 7 out 13 courses from the 5th to the 7th semesters.

Corresponding courses: Bioinorganic Chemistry, Surface Chemistry, Pharmaceutical Analysis, Organometallic Chemistry, Biomaterial, Modern Separation Technology, Electrochemistry, Material Analysis, Polymer Materials, English for Applied Chemistry, History of Chemistry and Innovative Thinking, Food Chemistry and Analysis, and Inorganic Materials.

7) General Courses (19 ECTS)

Learning objectives: to cultivate the humanistic literacy, social skills and team spirit of students; conduct physical exercises and keep fit; conduct necessary military training and master basic military skills.

General requirements: improve basic physical fitness, master basic military skills, master basic knowledge of humanities and social sciences, possess good humanities and professionalism, and clarify personal responsibility for social development; through various social practice activities, advocate the realization of self-worth and the shaping of team spirit, and cultivate the ability to adapt to social development.

Corresponding courses: Morality and Law, Chinese History, Philosophical Foundation, Socialist Theory, Military Theory, Military Training, Physical Education, Innovation and Practice, Music and Art Education, Global Vision and Economic Management, Science and Engineering Ethics, Social Practice and Other Courses.

8) Experiments and Practice (51 ECTS)

Learning objectives: To understand and master the basic or common chemical synthesis process, the basic operation and working principle of related test equipment, and cultivate the practical ability of students.

General requirements: Through the combination of theoretical knowledge, experiment and practice, students can further consolidate and deepen the basic theoretical knowledge they have learned and deepen their understanding of the application fields of the program.

Corresponding courses: Analytical Chemistry Experiment, Inorganic Chemistry Experiment, Biochemistry Experiment, Organic Chemistry Experiment, Physical Chemistry Experiment, Experiment of Instrumental Analysis, Experiment of Chemical Engineering Principles, Basic Comprehensive Professional Experiment of Applied Chemistry, Professional Experiment of Applied Chemistry (1), Professional Experiment of Applied Chemistry (2) and Cognition Practice.

9) Undergraduate Graduation Project (40 ECTS)

Learning objectives: Through the graduation project, students should have the ability to analyse engineering problems and solve problems based on the designed tasks.

General requirements: Complete the graduation project task under the guidance of the tutor, and pass the defense.

Corresponding courses: Internship and bachelor thesis.

Language education (English) and general education courses, including philosophy, history, and physical education are provided in semesters 1 - 5 for students to learn languages and humanities and to improve their cross-cultural communication skills and humanistic literacy. Mathematics and science foundation and information modules are offered in semesters 1 - 4 to provide the necessary knowledge of sciences. Among them, advanced mathematics courses are offered in semesters 1 and 2, and linear algebra, probability theory and

mathematical statistics courses are offered in semesters 2 – 3. Physics and informatics courses are offered in semesters 1 - 4 so that students can master the basic knowledge of computer science. Meanwhile, the professional basics modules are set in semesters 1 - 5, including courses in inorganic, organic, physical, and analytical chemistry to lay a solid foundation for the subsequent professional modules. In semesters 5 - 7, the core professional courses of applied chemistry are offered. The professional elective modules are provided in semesters 5 – 7. The theoretical courses are supplemented by laboratory practise, which focus on cultivating students' practical skills and experimental methods. In semester 7 - 8, the internship and the Bachelor's theses take place.

Since USST has the goal to further internationalising its degree programmes, the peers discuss with the programme coordinators and students if any chemistry classes are taught in English. The programme coordinators explain that almost all courses are delivered in Chinese (with exception of the English language classes in the first four semesters), but presentations are done in English in the basic courses of the first and second year. Later, also English textbooks and scientific papers are used. Some of the electives in the third and fourth year of studies are conducted in English. The students confirm that some parts of the lectures include English elements, however, they wish for more opportunities for actively practising English. The peers support this point of view and are convinced that more active English speaking would be useful. In general, the peers gain the impression that there could be more English elements in the chemistry courses and students should be encouraged to actively speaking English. This could be achieved e.g. by offering a journal club, where students present and discuss current scientific papers in English.

In general, the students are satisfied with the organisation and structure of the degree programme. They only would like USST to offer more opportunities for doing sports and the gym needs renovation. In addition, they point out that distances between the lecture rooms are sometimes very long, making it impossible for students to reach selected classes, scheduled shortly after the classes in other lecture structures, in time. USST should take this into account when scheduling the classes.

During the audit, the peers discuss with USST's partner from the industry if they are satisfied with the graduates' qualification profile and if they think that anything is missing in the curriculum. In general, the employers are satisfied with the graduates' knowledge and skills. However, they suggest that USST should purchase some advanced technical equipment especially a Nuclear Magnetic Resonance Spectrometer (NMR) in order to train students how to use such sophisticated instruments and better prepare them for the job market. Another possibility would be to increase the co-operation with companies or scientific institutions that already have these devices so that USST does not have to buy them but let students use them at the respective company. In addition, USST should pay close attention

to new developments and technologies in the area of chemistry (e.g. enzyme chemistry, computational chemistry) and include these subjects in the curriculum. Moreover, students should be better prepared for doing teamwork and they should have a broader spectrum of internship activities offered in a foreign language, such as English.

International Mobility

USST organises students' academic mobility according to a "five-year plan", where the internationalisation strategies are described in detail. 2021 is the first year of the 14th "five-year plan" of USST.

There are several partnerships with universities abroad, including Massachusetts Institute of Technology (USA), Sloan School of Management, Syracuse University (USA), City University of New York (USA), University of Stuttgart (Germany), Loughborough University (UK), University of Sheffield (UK), Edith Cowan University (Australia), Hanyang University (South Korea), Chuo University (Japan), National Ilan University (Taiwan), and University of Applied Sciences Hamburg (Germany). Since 2005, graduates of the Shanghai-Hamburg College receive an accredited German Bachelor's degree in addition to the Chinese Bachelor's degree. The joint educational programme is to introduce a German engineer (FH) training mode and make a full use of German teachers and other teaching resources. Currently, three undergraduate programmes are offered by the Shanghai-Hamburg-College: electrical engineering and automation, machinery manufacturing and automation, and international economics and trade. The purpose is to train talents for the needs of the rapid development of Chinese-German modern industries, and particularly train personnel for the needs of German Multinational Companies in China. In addition, USST has established the Sino-British College, which is an international university college, jointly established by USST and nine British universities.

The Shanghai Municipal Education Commission annually provides USST with financial support to carry out various kinds of international programmes mainly including international exchanges and international accreditation procedures. For example, USST spent about 6 million EUR for the international higher education in 2018, 987 students of USST went abroad for both further studying and taking part at exchange programmes. At the same time, 480 international students were invited to study at USST. Over 200 full-time teachers went abroad for long- and short-term stays and international cooperation. In addition, 55 foreign teachers and students were invited for a short-term exchange or cooperation programme (one month or longer).

The Department of Chemistry has close contact and scientific research cooperations with several foreign high-level universities. This includes for example the Leibniz-Institut für Katalyse, Max Planck Institute of Polymer Research, Universidad de La Habana, University of

Waterloo, North Dakota State University, Temple University, Pacific Northwest National Laboratory, University of Kentucky, Kyoto University, Kanazawa University, National University of Singapore, Nanyang Technological University, and University of Tartu. The Department of Chemistry mainly carries out the international exchange and cooperation programmes according to the strategies of USST, including short- and long-term exchange programmes, sino-foreign cooperative education, as well as further study abroad for students after graduation.

Usually, undergraduate students can apply for joining international exchange programmes through the International Affairs Office of USST. On average, 5 % of the Bachelor's students are going abroad per year. At the same time, undergraduate students from international universities are invited to the Department of Chemistry. For example, in 2018 and 2019, there were visiting groups (about 15 students per group) from the Department of Chemistry of Okayama University for a short-term exchange programme. In addition, the Department of Chemistry is currently trying to establish a double degree programme with the University of North Dakota.

The peers confirm that credits acquired abroad can be recognized at USST according to the "Recognition Method of the Scores and Credits Acquired from Other Universities for Undergraduates of USST". Usually, credit recognition is based on the module descriptions (syllabus) of both universities, which may differ to a certain extent. The amount of recognized credits then depends on the similarity rate of the respective course at the international university and of the corresponding course at USST.

Criterion 2.2 Work load and credits

Evidence:

- Self-Assessment Report
- Study plan
- Module descriptions
- Discussions during the audit

Preliminary assessment and analysis of the peers:

At USST, a theoretical course of 16 contact hours corresponds to one Chinese credit (except for Foreign Language and General Education Courses). As for practical courses, 32 contact hours correspond to one Chinese credit. Chinese credits count contact hours only, while ECTS points also take self-study hours into account. In the perspective of ECTS points, the workload of a student is the sum of his/her contact hours and self-study hours. In general,

30 study hours (including contact hours and self-study hours) are equivalent to one ECTS points. When Chinese credits are translated into ECTS points, the average credits for one academic year are 60 ECTS credits or 1800 study hours.

The peers perceive that the underlying credit hour system used for assigning credit points is not consistent with respect to the students' total workload and the awarded ECTS points. Since USST awards ECTS point, they need to follow the ECTS Users' Guide and take into account the time students typically need to complete all learning activities (such as lectures, seminars, projects, practical work, self-study, and examinations) and these need to be ascribed separately to each component of the curriculum.

Since workload is an estimation of the average time spent by students to achieve the expected learning outcomes, the actual time spent by an individual student may differ from this estimate. Individual students differ: some progress more quickly, while others progress more slowly. Therefore, the workload estimate should be based on the time an "average student" spends on self-studies and preparation for classes and exams. The initial estimation should then be verified via students' questionnaires.

The inconsistencies and deviations from the ECTS Users' Guide become clear when looking at the workload and the ECTS points awarded for the internship and the graduation project. As USST explains, the internship has a total workload of 260 hours (240 hours of contact hours and 20 hours of self-studies) and 15 ECTS points are awarded. This means that only 17.3 hours of students' workload are needed for one ECTS point. Moreover, for the Bachelor's thesis, 440 hours of students' workload are calculated and 25 ECTS points are awarded. So one ECTS point is awarded for only 17.6 hours of students' total workload. This is very low and is not aligned with the general rate of 30 hours per ECTS point. On the other hand, for the General Courses and Experiments and Practise the relation between ECTS points and students' total workload is much higher than this. For example, one ECTS point is awarded for 44.2 hours (General Courses) and 40.3 hours (Experiments and Practise). The peers point out that the ECTS Users' Guide allows for a certain range of student working hours per ECTS point, but this rate must be made transparent and cannot differ from one course to another, but should rather be standardised.

The students confirm during the audit that their workload is high but manageable. In addition, there is a comprehensive tutoring system (student counsellors, academic tutors, thesis supervisors) ensuring that students manage their academic workload and to not fall behind or drop out of the study programme. In addition, the students' parents are contacted in some special cases e.g. if a student struggles with her/his academic requirements or if she/he has some psychological problems. As a result, almost all students finish the degree

programme within the expected period of four years and on average only two students drop out of the programme per year.

In summary, the auditors conclude that there is no general structural pressure on the quality of teaching and the level of education due to the workload. The total workload appears to be adequate and the students are able to complete the degree programme without exceeding the regular period.

However, USST must make sure that the actual workload of the students and the awarded ECTS credits correspond with each other and make that information transparent in the module descriptions and the study plans. Furthermore, USST needs to anchor in an official regulation, how many hours of students' total workload are required for awarding one ECTS point and this rate must be the same fixed for every course in the Bachelor's programme Applied Chemistry.

Criterion 2.3 Teaching methodology

Evidence:

- Self-Assessment Report
- Study plan
- Module descriptions
- Discussions during the audit

Preliminary assessment and analysis of the peers:
In the Bachelor's degree programme Applied Chemistry, several different educational methods such as lecture, seminar, practical laboratory work, internship, and Bachelor's thesis are applied.

The overall learning model at USST is aimed at improving the students' competences through discussions, practical work, and lectures. Practical work is designed to impart good laboratory skills and is usually done as a group activity. Teachers use a variety of teaching methods, which are based on the characteristics of the respective course. In addition, they are encouraged to make use of modern and interactive teaching methods such as flipped classroom or blended learning by using multimedia and network technologies.

To help the students to achieve the intended learning outcomes and to facilitate adequate learning and teaching methods USST provides a digital learning platform, where students can select courses, evaluate teaching, and check scores. At the same time, teachers can release teaching calendars, provide information for students and courses, and manage the

grades. The students confirm during the audit, that the teaching methods are suitable and that they are provided with all necessary documents and information about the courses. There is also a working digital platform where teachers provide course material and communicate with the students.

In summary, the peer group judges the teaching methods and instruments to be suitable to support the students in achieving the intended learning outcomes.

Criterion 2.4 Support and assistance

Evidence:

- Self-Assessment Report
- Study plan
- Module descriptions
- Discussions during the audit

Preliminary assessment and analysis of the peers:
USST provides a comprehensive support system for all students on different levels. Each student is assigned an academic tutor at the beginning of the degree programme. On average, each member of the teaching staff supervises about five students. Tutors are the first to be contacted by the students with any kind of problems, be it purely academic or even private. Similarly, a personal supervision is organised during the internships and graduation projects when students and supervisors meet on a regular basis and discuss issues and progress.

In addition, each programme at USST has full-time student counsellors who are responsible for the life guidance and psychological counselling of students. They help in building a bridge for the communication between USST and the students' families, organizing students to hold various cultural and sports activities, so as to provide students with a healthy, safe and energetic learning and living environment. The counsellors introduce the programme's structure and give professional career direction to the freshmen and help them setting reasonable career goals.

Apart from the personal advice and academic support, USST offers a broad variety of support measures be it in the form of sports clubs, social activities, science clubs, or research projects.

The peers see that the teachers are approachable and accessible and there are enough resources available to provide individual assistance, advice and support for all students.

The support system helps the students to achieve the intended learning outcomes and to complete their studies successfully and without delay. The students are well informed about the services available to them.

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

The peers agree with the plan of giving students more opportunities for actively practising English by adding 1-2 chemistry courses taught in English to the curriculum, increasing the English elements of some chemistry courses, and offering a journal club where both undergraduate and graduate students are encouraged to present and discuss their current scientific results and papers in English. They also appreciate that USST follows their suggestion and will establish courses in enzyme chemistry and computational chemistry and add them to the curriculum. The peers hope that the changes will be implemented this year.

USST agrees that students should be better prepared for doing teamwork and should be offered broader spectrum of internship activities. For this reason, USST gives every student the opportunity of participate in the students' innovation and entrepreneurship training programme where they conduct group projects. Students can also join research group and participate in their projects. The peers appreciate these opportunities and suggest that students should be encouraged to join the projects.

In order to provide students with a broader spectrum of internship USST negotiates with some international companies to establish co-operation agreements. The peers support these efforts!

With respect to the students' workload, the peers confirm that USST has updated the respective questionnaire in order to verify the time students spend on self-studies. They expect that this will be repeated and the end of each semester and if discrepancies are found, adjustments need to be made. In addition, it should be made transparent in all relevant documents that USST calculates 30 hours of students' total workload for one ECTS point.

The peers consider criterion 2 to be mostly fulfilled.

3. Exams: System, concept and organisation

Criterion 3 Exams: System, concept and organisation

Evidence:

- Self-Assessment Report
- Study plan
- Module descriptions
- Exam Regulations
- Discussions during the audit

Preliminary assessment and analysis of the peers:
According to the Self-Assessment Report, a variety of examination forms is used for assessing the intended learning outcomes. In the course of the degree programme, the students' achievements are assessed by different methods such as written exams, oral exams, laboratory reports, assignments and homework, presentations, quizzes, internship report, and Bachelor's thesis.

There is also an ongoing monitoring of the students' progress in their studies; it is evaluated by the teaching staff based on participation and preparation for the classes. The main objective of the assessment process is measuring students' achievements against the intended learning outcomes. Exams may be written or online. Online exams mostly including multiple-choice tests and computational problems, while written exams typically include short questions, essays, and solving problems.

To facilitate students' preparation, USST generally arranges the final exams in the last week at the end of each semester. The exam time for some electives can be arranged by teachers, but it should be completed in the current semester. The exam forms are expressly stated in the module description of each course. The academic performance for each module is graded on a scale from 0 to 100.

The internship is a 10-week training programme, usually conducted in the last semester of the Bachelor's programme Applied Chemistry. During the internship, students should carefully record the content and learned lessons of the internship. After finishing the internship, they are required to write an internship report based on their notes and experiences. The internship instructor (from the company) should clearly assign the tasks, goal, and assessment methods. During the internship, the instructor should assign a certain amount of exercises or homework, check the internship records, correct their internship assignments, and guide them to complete the internship. After the internship is completed, the instructor should make proper assessment and evaluation of the students' internship results. . If students have difficulties completing the internship, their internship mentors evaluate their progress in collaboration with the University and support them.

The Bachelor's thesis is the students' last and most important task during the four-year study period. It is designed as a comprehensive summary of the results of students' learning and research activities and practice, and an important basis for students' graduation and degree qualification. The thesis supervisor should be able to clarify the topic, propose clear requirements, introduce reference materials, and review the outlines prepared by students. In addition, they should meet with the students at least once a week for discussing possible issues and helping with questions and problems. Each graduation project (Bachelor's thesis) has several parts, such as title setting, proposal design, research plan, experimental process, result analysis, and thesis finalisation, all of which are under the guidance of a supervisor. Teachers offer graduation projects based on their scientific research. All approved topics are presented to the students for selection in the middle or at the end of the seventh semester. In addition, students can also suggest topics for their graduation projects and mentors from companies can offer topics. Students need to defend their graduation project in front of a group of teachers (three or more), and the group leader needs to be at least an associate professor. The defense process includes two sessions: graduation thesis presentation and questions by the teachers and is conducted publicly. After the defense, the defense group will grade the graduation project: 40 % for the supervisor's review of the student's performance, thesis writing (20 %), and thesis defense (40 %).

Teachers submit the students' exam results, which are analysed by the School of Materials and Chemistry in order to give feedback to students who need to improve their grades. If a student fails two courses in one semester, a special tutor will be arranged to supervise and guide his/her subsequent learning efforts. At the same time, the School of Materials and Chemistry will keep in touch with the students' parents and inform them about their childrens' academic performance. The School of Materials and Chemistry rewards tutors who have achieved good guidance results.

Students who fail an exam (except for practical courses) can repeat it at the beginning of the next semester and have the opportunity to retake the whole course and attend the regular exam of the course if the repeated exam is failed again.

The peers confirm that there is a form of assessment for each course and that all students are well informed about the form of assessment and the details of what is required to pass the course. The organization of the exams guarantees that delays in the study progress are avoided. The relevant rules for examination and evaluation criteria are put into a legal framework, as both students and lecturers confirm during the audit. The date and time of the exams and how the exams are taken is announced to the students in due time at the beginning of each semester.

In the course of the audit, USST submits several samples of exams and theses. The peers examine the samples and are satisfied with their quality.

The peers come to the conclusion that the examinations are suitable to verify whether the intended learning outcomes are achieved or not.

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

USST does not comment on this criterion in its statement.

The peers consider criterion 3 to be fulfilled.

4. Resources

Criterion 4.1 Staff

Evidence:

- Self-Assessment Report
- Staff handbook
- Study plan
- Module descriptions
- Discussions during the audit

Preliminary assessment and analysis of the peers:

The auditors confirm that USST has a sufficient academic staff and is well equipped for teaching. According to the Self-Assessment Report, there are currently 33 faculty members in the Department of Chemistry, including 30 full-time teachers (6 professors, 10 associate professors, and 14 lecturers) and 3 administrative and laboratory technicians. There are 11 teachers with overseas experience and all full-time teachers have doctoral degrees. In addition, there are seven more technical assistants working at the Chemical Experiment Center, which is sufficient for conducting the practical courses there.

At USST, the staff members have different academic positions. There are full professors, associate professors and assistant professors. The academic position of each staff member is based on research activities, publications, results of the questionnaires, supervision of students, feedback from other (senior) teachers, and international experience. In addition,

the responsibilities and tasks of a staff member with respect to teaching load, research, and supervision depend on the academic position.

At USST, teachers are promoted according to the "Employment Regulations for Teaching Staff and Other Specialty Technical Staff in USST", which defines the requirements with respect to ideological and political performance, professional ethics, physical condition, years of service, academic and technical ability, educational and teaching ability, annual assessment, and foreign language and computer skills. Teachers at USST have no permanent positions, but are assessed every 3 – 6 years (depending on their position) and new contracts are subsequently signed.

During the audit, the peers learn that there is a regulation at USST setting the teaching load at nine hours per week. The teachers confirm that their teaching load is adequate and that they have enough time for advising students, conducting research activities, and doing administrative tasks. Most of the teachers not only give classes in the Applied Chemistry programme but also teach in other undergraduate (non-chemistry majors) and graduate programmes. On average, each teacher supervises one to two graduation projects (Bachelor's theses) per year. The teachers also confirm that there are enough resources for conducting research activities and that sufficient funds are available.

Due to the Covid-pandemic, international lecturers are currently not able to visit USST and at the same time, international travelling for Chinese students is almost impossible. For this reason, the peers recommend inviting international guest lecturers to give online lectures, so that students get more familiar with the English language and get more insight on current developments in other countries in the area of applied chemistry.

In summary, the peers confirm that the composition, scientific orientation and qualification of the teaching staff is suitable for successfully implementing and sustaining the Bachelor's degree programme Applied Chemistry. There are enough resources available for administrative tasks, and supervision and guidance of students.

Criterion 4.2 Staff development

Evidence:

- Self-Assessment Report
- Staff handbook
- Discussions during the audit

Preliminary assessment and analysis of the peers:

At USST, there are sufficient offers and support mechanisms available for teachers who

wish to further develop their professional and teaching skills. For example, to improve young teachers' professional competences, USST arranges a one-month pre-job training every year. In addition, organised by the Shanghai Municipal Education Commission, USST also offers a three-month comprehensive training programme for newly recruited teachers to improve their didactic and teaching skills. Moreover, in the course of the "Young Teacher Guidance Programme" mentors are assigned to young (under the age of 35) staff members who have just joined USST.

Founded in 2015 at USST, the Center for Faculty Teaching Development (CFTD) works with faculty, staff and academic administrators campus-wide to support and enhance learning and teaching by connecting innovative teaching strategies and instructional technologies. CFTD offers a variety of curricular and instructional development activities, and provides both cross-disciplinary and discipline-specific programs customized to the individual needs of faculty, staff and departments. These include Teaching Assistant Training, Teaching Developing Forum, Teaching Excellence Award, workshops and salons for innovative teaching methods and technologies. CFTD sponsors competitions for grants to enhance teaching and learning at USST, supports faculty members to take part in a variety of national-wide teaching contests of different disciplines, and offers consultancy to individuals and groups on all aspects of teaching.

All teachers at USST have the opportunity to apply for funding from the China Scholarship Council (CSC) and the Shanghai Municipal Education Commission for overseas stays, inviting visiting scholars, and joining industry-university-research practice programmes. They can receive training and study abroad for more than one year, pursue further studies in domestic universities and research institutes for one year, or conduct a one-year internship in a company.

In addition, USST provides a special fund for supporting young teachers for spending up to two years at international universities in order to follow their research interests, to get international experience, and to improve their language and teaching skills. International experience is also a criterion when teachers apply for promotion an extension of their contract.

During the discussion with the peers, the teachers express their satisfaction with the support by the USST and the opportunities for further didactic and scientific development. The comprehensive support system for teachers to further developing their didactical and professional skills is one of the strong points of USST.

Criterion 4.3 Funds and equipment

Evidence:

- Self-Assessment Report.
- Videos of the facilities
- Discussions during the audit

Preliminary assessment and analysis of the peers:

The USST Laboratory Management and Service Centre is an administrative institution directly led by USST. Under the direct leadership of the principal in charge, the centre is responsible for planning and constructing all laboratories of USST, purchasing and maintaining teaching and research equipment, and the organisation of practical laboratory work at USST.

Teachers can also apply for scientific research projects to the National Natural Science Foundation of China, the Ministry of Science and Technology, Shanghai Municipality, and Shanghai Municipal Education Commission. Once approved, they can obtain funds in hundreds of thousands of yuan.

The peers confirm that USST puts great importance on laboratory safety, and has taken a series of measures to strengthen laboratory safety awareness of all staff and students of USST. On the basis of "Higher Education Institutions Laboratory Work Specifications", USST has formulated safety operation specifications for the laboratories of each programme.

In addition, the School of Materials and Chemistry has established the “Working Committee for Work Safety (Laboratory Safety) at the School of Materials and Chemistry” and set a safety column on the school’s website to publish safety-related work dynamics, regulations, safety information, etc. The School of Materials and Chemistry also issues the “Laboratory Safety Violation Score Inspection Measures of the College of Science” for weekly safety inspections of all chemical laboratories. Before the start of each experimental course, the safety risk assessment of the experiment is carried out. Students receive safety instructions and are personally protected during the laboratory work by wearing goggles, protective gloves, lab coats, and other personal protective equipment.

The practical courses are conducted at the Chemical Experiment Center, which was set up by the College of Science, and will be transferred to School of Materials and Chemistry, a newly formed school from the amalgamation of the Department of Chemistry and the School of Materials and Engineering of USST. At present, the Chemical Experiment Center consists of nine undergraduate teaching laboratories providing workplaces for students from both the Applied Chemistry programme and other programmes of USST.

In the course of the audit, USST provides a video detailing the technical equipment at the Department of Chemistry and the Chemical Experiment Center. The peers see that the laboratories are well equipped and that there are enough working places for all students. They are particularly impressed by the good technical equipment and the extensive and modern laboratory facilities. The laboratory equipment and the instruments are new and state of the art, which is necessary for up-to-date teaching in the area of chemistry.

However, employers, teachers, and students suggest, in accordance with the peers, purchasing some advanced instruments like a NMR. In addition, the available advanced equipment should be used by the students in the practical courses.

The USST library offers access to electronic scientific and educational resources and to the electronic library system, including current publications that are needed for studying and research. Overall, the students are very satisfied with the available literature and services provided by the library. They also express their general satisfaction with the available resources and conditions of studying.

The auditors conclude that there are sufficient funds and equipment and that the infrastructure (laboratories, library, seminar rooms etc.) in general complies with the requirements for sustaining the degree programme.

Final assessment of the peers after the comment of the Higher Education Institution regarding criterion 4:

The peers thank USST for pointing out that in 2021, an Instrumental Analysis Center was established, which offers sophisticated equipment like TEM, NMR, and Atomic Force Microscope (AFM). These advanced instruments are used for conducting research activities and for teaching students.

The peers appreciate that USST agrees with their suggestion of inviting more international guest lecturers for giving online-lectures.

The peers consider criterion 4 to be mostly fulfilled.

5. Transparency and documentation

Criterion 5.1 Module descriptions

Evidence:

- Self-Assessment Report

- Module descriptions
- Webpage Department of Chemistry: https://mse.usst.edu.cn/
- Discussions during the audit

Preliminary assessment and analysis of the peers:
After studying the module descriptions, the peers see that the information about the students' total workload and the awarded ECTS points is not consistent in all cases. For example, this applies to the module "Biochemitsry", "Material Chemistry", the internship, and the Bachelor's thesis. Here, the students' total workload and the awarded ECTS point are not aligned (see criterion 2.2).

In addition, the peers notice some overlaps in the content. For example, this concerns thermodynamics, which is taught in physics, organic chemistry and physical chemistry and the modules "Module Polymer Chemistry" and "Modern Separation Technology".

For this reason, the peers expect USST to update the module descriptions, to check for inconsistencies and to include the information about the students' total workload and the awarded ECTS points.

Criterion 5.2 Diploma and Diploma Supplement

Evidence:

- Self-Assessment Report
- Sample Diploma Supplement
- Sample Transcript of Records

Preliminary assessment and analysis of the peers:
The peers confirm that the students of the Bachelor's programme Applied Chemistry are awarded a Diploma and a Diploma Supplement after graduation. The provided sample Diploma Supplement includes all necessary information about the degree programme and follows the European template.

Criterion 5.3 Relevant rules

Evidence:

- Self-Assessment Report
- Webpage Department of Chemistry: https://mse.usst.edu.cn/

- Exam Regulation
- Discussions during the audit

Preliminary assessment and analysis of the peers:
The auditors confirm that the rights and duties of both USST and the students are clearly defined and binding. All relevant information about the degree programme (study plan, module descriptions, learning outcomes) is published on the department's website and hence available to all relevant stakeholders.

Final assessment of the peers after the comment of the Higher Education Institution regarding

The peers confirm that USST has updated the module handbook and corrected the information about the students' total workload and the awarded ECTS points. In addition, the module descriptions have checked and updated in order to avoid overlaps and to solve inconsistencies

The peers consider criterion 5 to be fulfilled.

6. Quality management: Quality assessment and development

Criterion 6 Quality management: quality assessment and development

Evidence:

- Self-Assessment Report
- Discussions during the audit

Preliminary assessment and analysis of the peers:
The auditors discuss the quality management system at USST and the Department of Chemistry with the programme coordinators. They learn that there is a continuous process in order to improve the quality of the degree programme and it is carried out through internal and external evaluation.

Internal evaluation of the quality of the Bachelor's degree programme Applied Chemistry is provided through students' satisfaction questionnaires, graduate and employer surveys.

Students' assessment of teaching quality is an essential part of the quality assurance system at USST. At the end of each semester, the Office of Academic Affairs of USST will organize a questionnaire to be filled out by students in each course in order to evaluate the teachers' performance in the teaching processes. The questionnaires are filled out online, collected, and analysed by the Office of Academic Affairs. Students have to fill out the questionnaires; otherwise, they cannot access their grades on the digital platform. The results are analysed and submitted to the Deans and forwarded to the relevant teachers. The results are used for improving the quality of teaching and are linked to the teachers' work performance, which is also one of the criteria for promotion. As described under criterion 2.2, it would be useful to include a question in the students' satisfaction questionnaire "Undergraduate Course Teaching Quality Evaluation Form" about how much time students spend on the course in order to determine the students' actual workload for each class.

In December of each year, the Office of Academic Affairs and the School of Materials and Chemistry will also organize the selection of the "Course Teaching Excellence Award of USST" and the "Teaching Quality Excellence Award of the School" to award excellent teachers recognized by students, peers, and teaching supervisors.

All teachers receive evaluations from both teachers and students at the end of the course. According to the results, teachers make plans to improve their teaching. In addition, each semester senior students are asked to evaluate their achievements and acquired competencies through the graduates' survey.

As the peers find out during the discussions with the teaching staff and the students, the results of the students' surveys are usually not discussed with the students.

The auditors gain the impression that the survey is mainly used for evaluating the teachers' performance and comparing them with each other in order to assist career development decisions and not for further developing the degree programme. The faculty members confirm that the survey results are taken into account if they want to be promoted (e.g. from associate professor to full professor). The auditors point out that students need to be informed about the results of the questionnaires and that all teachers discuss with them how to improve the course. The aggregated results of the students' surveys are published on USST's webpage. However, the teachers should talk with their students about the results of the questionnaires in the specific course. If there is negative feedback, means of solving the issues should be directly discussed between teachers and students.

USST has established the "Student President Assistants", 10 students represent their fellow students and act as assistants to the university's president by giving suggestions in meet-

ings with different offices. However, the peers think that it would be very useful to institutionalise students' participation in the decision-making processes also on department level. This will increase their involvement in further improving the degree programme.

As described in the Self-Assessment Report, graduates of the Bachelor's programme Applied Chemistry find suitable jobs in the area of R&D, material analysis and testing, and other chemical-related work. Typical employers are companies and research institutes such as Estee Lauder, Danone, Procter & Gamble, Henkel, China Shipbuilding Group, SGS, Insback, Nippon, Sinopec, Shanghai Organic Research Institute of CAS, Shanghai Jahwa, WuXi AppTec, Bluemoon, Shanghai Huayi Group, and Shanghai Research Institute of Materials. The graduate employment rate (including continuing graduate education in China and abroad) has reached more than 97 %, and the proportion of graduates who pursue further academic studies is significantly higher (on average 35 %) than in other programmes.

Shanghai is an important birthplace of China's modern chemical industry. The chemical industry and related industries are Shanghai's main pillar industries, with large-scale Shanghai Chemical Industry Park and Shanghai Fine Chemical Industry Park. There are many domestic and foreign well-known chemical industry and related pharmaceutical, materials, electronics and other companies in Shanghai, such as Shanghai Petrochemicals, Shanghai Huayi, BASF, Dow Chemical, Shanghai Pharmaceuticals, and Shanghai Roche Pharmaceuticals, requiring a large number of professionals in chemistry and chemical engineering. After graduation, students of this program can engage in technology, R&D and other related work in chemistry and chemical engineering, medicine, analysis and testing, materials, and fine chemicals.

USST has a tracking system for undergraduate students. Statistics on the employment of graduates of this program indicate that there were more than 200 students majoring in Applied Chemistry who graduated from USST in the past five years. The majority of graduates (over 70 %) stay in Shanghai for employment or postgraduate studies, and nearly 80 % of them work in these chemistry-related units in Shanghai. In general, the job perspectives for the graduates are very good and there is a high demand for qualified chemists especially in the Shanghai area.

During the audit, the peers learn that there is not an advisory board with external stakeholders at the Department of Chemistry, but the department receives a comprehensive programme assessment from the Shanghai Municipal Education Commission every five years. The Department of Chemistry also invites senior professors from research institutes (Changchun Institute of Applied Chemistry of the Chinese Academy of Sciences and Shanghai Institute of Materials) to provide consultation and guidance for the further development of the discipline and the programme. In addition, experts from chemical engineering

institutes like China National Institute of Chemical Industry for Daily Use and Chemical Engineering Center of Shanghai Textile Research Institute are invited to provide guidance in revising the curriculum. Moreover, experts from companies such as Shanghai Huayi (Group) Technology Center and Shanghai Pharmatech New Drug Development Co., LTD give lectures and supervise graduation projects and internships. As the peers consider the input of the employers to be very important, they appreciate their involvement.

In summary, the peer group confirms that the quality management system at USST is suitable for identifying weaknesses and improving the degree programme. The students are somewhat involved in the process but not all feedback loops are closed.

Final assessment of the peers after the comment of the Higher Education Institution regarding criterion 6:

The peers acknowledge that USST considers the discussion with the students about the results of the students' surveys to be important for further developing the degree programme. Currently, teacher-student discussions about how to improve the courses are conducted 1-2 times per semester but the results of the students' surveys for each course are not generally accessible. The Office of Academic Affairs will officially require teachers to talk with the students about the results of the questionnaires, especially, when there is negative feedback. In addition, the aggregated results of the students' surveys will be published by the Office of Academic Affairs on USST's webpage.

The peers support these plans and expect USST to provide suitable documentation on the results in the further course of the accreditation procedure.

The peers appreciate that USST will institutionalise students' participation in the decision-making processes on department level by selecting four students from each intake year as representatives to participate in the decision-making processes of the Department of Chemistry.

In addition, the Department of Chemistry is planning to establish an advisory board with external stakeholders with professors and engineers from other universities, institutes, domestic and foreign enterprises. The advisory board will be invited every four years to assess the development of the degree programme and to participate in the adjustment of the curriculum. The peers support this plan, although, it would be more useful to invite them more often than only once every four years.

The peers consider criterion 6 to be mostly fulfilled.

D Additional Documents

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

- none

E Comment of the Higher Education Institution (28.01.2022)

USST provides the following documents

- Appendix G Module Handbook of Applied Chemistry-updated
- Appendix V Undergraduate Course Teaching Quality Evaluation Form
- Appendix W-Survey questionaire of students' self-study hours
- Appendix X Workload of the curriculum of applied chemistry program

and the following detailed statement:

1. (mentioned in Criterion 1.3 Curriculum)

The peers cannot deduct from the submitted study plan, which electives the students have to take in which semester. For this reason, they suggest designing a study plan, which also includes the electives and makes the course schedule and selection more transparent. This study schedule should be published on the programme's webpage.

Answer: Thanks for experts' feedback and good suggestions. We designed a study plan shown in Table S1 to make students understand what courses they have to choose in each semester. Also we will add course selection guidance in the first year and interpret the training plan. At the same time, before selecting courses in each semester, necessary explanations will be given for the courses selected in each semester. This study schedule has been published on the programme's webpage for students to check at https://mse.usst.edu.cn/Undergraduates/Applied_Chemistry/Training_Program.htm

Table S1 Study plan of the Applied Chemistry Programme

Semester 1	Semester 2	Semester 3	Semester 4	Semester 5	Semester 6	Semester 7	Semester 8
Advanced Mathematics A (1)	Advanced Mathematics A (2)	Probability Theory and Mathematical Statistics	College English (4)	Biochemistry	Fine Chemicals	Materials Chemistry	Cognition Practice
Engineering Drawing	College Physics	College English (3)	Program Design and Practice	Polymer Chemistry	Spectrum Analysis	Medicinal Chemistry	Bachelor Thesis
College English (1)	Linear Algebra	Inorganic Chemistry (2)	Organic Chemistry (2)	Instrumental Analysis	Organic Synthesis	Professional Experiment of Applied Chemistry (2)	
Information Technology	College English (2)	Organic Chemistry (1)	Principles of Chemical Engineering	Structural Chemistry	Instrumental Analysis Experiment	Internship	
Analytical Chemistry	Inorganic Chemistry (1)	Physical Chemistry (2)	Physical Education (3)	Physical Education (4)	Basic Comprehensive Professional Experiment of Applied Chemistry	**Select 2 courses from the 4 courses:** 1) History of Chemistry and Innovative Thinking 2) Material Analysis 3) Food Chemistry 4) Inorganic Materials	
The Safety Techniques of Chemical Laboratory	Physical Chemistry (1)	Music and Art Education	Chinese History	Economic Management	Professional Experiment of Applied Chemistry (1)		
Morality and Law	Inorganic Chemistry Experiment	Socialist Theory	Global Vision	Electives	**Select 3 courses from the 5 courses:** 1) Pharmaceutical Analysis 2) Polymer Materials 3) Bioanalysis 4) Modern Separation Technology 5) Professional English in Applied Chemistry		
Military Theory and Training		Physical Education (2)	Ethics of Science and Engineering	Biochemistry Experiment			
Philosophical Foundation		Physical Chemistry Experiment	Innovation and Practice	**Select 2 courses from the 4 courses:** 1) Bioinorganic Chemistry 2) Surface Chemistry 3) Organometallic Chemistry 4) Electrochemistry			
Social Practice			Organic Chemistry Experiment				
Physical Education (1)			Experiment of Chemical Engineering Principles				
Analytical chemistry Experiment							

2. (mentioned in Criterion 2.1 Structure and modules)

1) The students confirm that some parts of the lectures include English elements, however, they wish for more opportunities for actively practising English. The peers support this point of view and are convinced that more active English speaking would be useful. In general, the peers gain the impression that there could be more English elements in the chemistry courses and students should be encouraged to actively speaking English. This could be achieved e.g. by offering a journal club, where students present and discuss current scientific papers in English.

Answer: Thanks a lot for experts' good comments. We totally agree, so we are planning to create more opportunities for students' actively practising English by adding 1-2 chemistry courses taught in English to the curriculum, increasing the English elements of some chemistry courses and offering students a journal club where both undergraduate and graduate students are encouraged to present and discuss their current scientific results and papers in English since 2022. In this way, students can be well trained in active English speaking, especially in professional English.

2) In general, the students are satisfied with the organization and structure of the degree programme. They only would like USST to offer more opportunities for doing sports and the gym needs renovation. In addition, they point out that distances between the lecture rooms are sometimes very long, making it impossible for students to reach selected classes, scheduled shortly after the classes in other lecture structures, in time. USST should take this into account when scheduling the classes.

Answer: We greatly appreciate experts' good suggestions! At USST, a four-floor sports fitness center has been under construction for several months for the purpose to offer more opportunities for doing sports and is expected to be put in use on Sep. 30, 2023. The total construction area of the center is 37,000 m^2, of which the above-ground construction area is 15,500 m^2, where leisure sports areas such as gymnasium, physical fitness center, ethnic traditional sports center, student physical health testing center, physical health research center, fencing hall, etc., with comprehensively improved conditions for fitness services will be open to teachers and students of USST. The underground construction area of the center is 21,500 m^2, and a large underground parking lot is set up, which will effectively alleviate the difficult parking problem that has plagued USST for many years. The architectural renderings of the sports fitness center are provided as follows.

The architectural renderings of the sports fitness center

In addition, we have discussed with the Office of Academic Affairs in charge of scheduling the classes about the issue that the distance between the two lecture rooms scheduled for before and after classes is sometimes too long to reach the selected classes for students. The office took it very seriously and will avoid it to the greatest extant when scheduling the classes.

3) In general, the employers are satisfied with the graduates' knowledge and skills. However, they suggest that USST should purchase some advanced technical equipment especially a Nuclear Magnetic Resonance Spectrometer (NMR) in order to train students how to use such sophisticated instruments and better prepare them for the job market. Another possibility would be to increase the co-operation with companies or scientific institutions that already have these devices so that USST does not have to buy them but let students use them at the respective company.

Answer: Thanks a lot! This is really a good suggestion. In 2021, USST has established an Instrumental Analysis Center and purchased some advanced equipment like TEM, NMR and atomic force microscope (AFM) which can be used to train students how to use such sophisticated instruments and better prepare them for the job market. The photos below are

the announcement of tender results for a 500M NMR and an AFM and their locations in the center which will be put in use in Sep. 2022.

核磁共振波谱仪中标结果公告(1)

必联网　发布时间：2021-12-16 14:14

预告　公告　变更　公示　结果

项目编号： 2523-214GXGJ11007/02　**公告类型：** 中标结果公告

招标方式： 国际公开　**截止时间：**

招标机构： 上海公欣招标代理有限公司　**招标地区：** 上海市

招标产品： 核磁共振波谱仪,原子力显微镜　**所属行业：** ;波谱仪;电子显微镜;

项目名称：核磁共振波谱仪

项目编号：2523-214GXGJ11007/02

招标范围：原子力显微镜 1台

招标机构：上海公欣招标代理有限公司

招标人：上海理工大学

开标时间：2021-12-10 09:30

公示时间：2021-12-10 17:46 - 2021-12-15 23:59

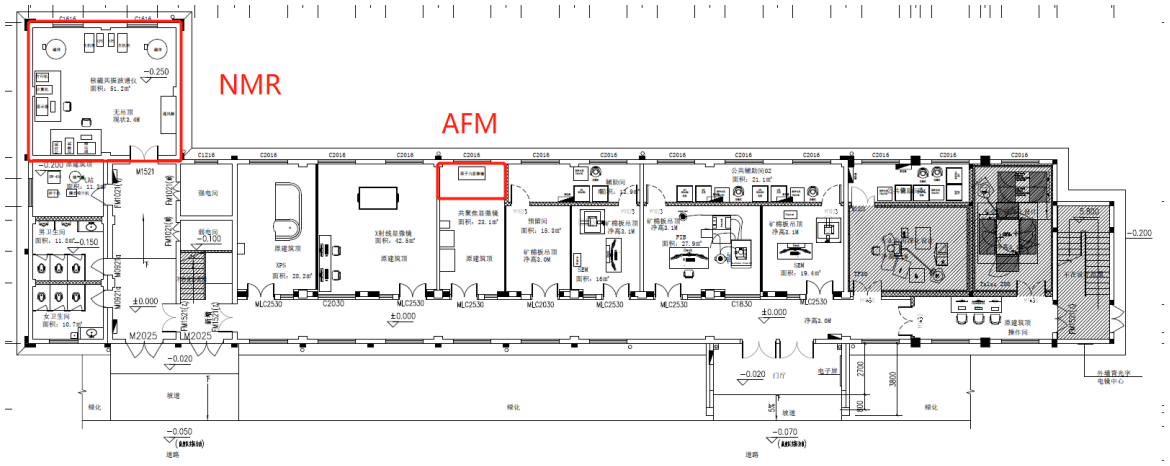
中标结果公告时间：2021-12-16 14:14

中标人：香港泰康国际贸易有限公司

制造商：布鲁克

制造商国家或地区：瑞士

Announcement of tender results for 500M NMR and AFM.



Partial planning map of the Instrumental Analysis Center

4) In addition, USST should pay close attention to new developments and technologies in the area of chemistry (e.g. enzyme chemistry, computational chemistry) and include these subjects in the curriculum.

Answer: According to experts' good suggestions, the courses like enzyme chemistry and computational chemistry will be added in the curriculum since 2022 for new developments and technologies.

5) Since workload is an estimation of the average time spent by students to achieve the expected learning outcomes, the actual time spent by an individual student may differ from this estimate. Individual students differ: some progress more quickly, while others progress more slowly. Moreover, students should be better prepared for doing teamwork and they should have a broader spectrum of internship activities offered in a foreign language, such as English.

Answer: We totally agree with experts in these two aspects. Currently, every student has the opportunity to participate in the students' innovation and entrepreneurship training program which includes innovation training projects, entrepreneurship training projects and entrepreneurship practice projects. Usually, students are required to apply for this program as a team and the average student number of a team is less than 4. Also, we offer students the opportunity to do scientific practice in teacher's research group and students are encouraged to join the research project as a team. Finally, as described in the self-assessment report, every new undergraduate student has a designated academic tutor to support his/her academic, professional and career development. Generally, the student joins in the academic tutor's research group to be prepared in doing cooperative scientific research with graduate students. By doing these things, students can be well trained to gain the ability to play a role in the team.

In addition, in order to provide students a broader spectrum of internship activities offered in a foreign language, such as English, as suggested by experts, we are negotiating with some international companies like BASF China, Dow Chemical, Shanghai Roche Pharmaceuticals, etc. to establish long-term cooperative relationships through signing the internship bases.

3. (mentioned in Criterion 2.2 Work load and credits)

1) Therefore, the workload estimate should be based on the time an "average student" spends on self-studies and preparation for classes and exams. The initial estimation should then be verified via students' questionnaires.

Answer: Yes, the workload estimate should be based on the time an "average student" spends on self-studies and preparation for classes and exams and the initial estimation should then be verified via students' questionnaires. So we made the questionnaire of students' self-study survey (see the attached Appendix W) for each course among four grades and the obtained statistical data show that the ratio of contact hours to self-study hours is about 1.0:0.88 for both theoretical and experimental courses (except for general courses)

and 1.0:2.0 for practice courses, as shown in Table S2, which means one ECTS point roughly corresponds 16 contact hours for both theoretical and experimental courses (except for general courses) and 10 contact hours for practice courses based on the criteria of 30 working hours (including contact hours and self-study hours) equivalent to one ECTS point. For general courses, usually there are not self-study hours except for three courses with 2 ECTS points, but only 6 self-study hours are needed. The experts' helpful suggestions are greatly appreciated.

Table S2 Ratios of contact hours to self-study hours for the courses

Year of Grade	**Ratio of contact hours to self-study hours**		
	Theoretical courses	**Experimental courses**	**Practice courses**
2018	1.0:0.90	1.0:0.87	1.0:2.0
2019	1.0:0.88	1.0:0.83	1.0:2.0
2020	1.0:0.89	1.0:0.88	1.0:1.6
2021	1.0:0.85	1.0:0.87	1.0:1.8
Average value	**1.0:0.88**	**1.0:0.87**	**1.0:1.9**
	Contact hours to self-study hours per ECTS point		
Average value	**16:14 (1.0:0.88)**	**16:14 (1.0:0.88)**	**10:20 (1.0:2.0)**

2) The peers point out that the ECTS Users' Guide allows for a certain range of student working hours per ECTS point, but this rate must be made transparent and cannot differ from one course to another, but should rather be standardised.

Answer: We greatly appreciate the experts' valuable comments. According to experts' helpful suggestions and the obtained ratios of contact hours to self-study hours for courses, the student working hours per ECTS point was recalculated carefully with 30 working hours (including contact hours and self-study hours) equivalent to one ECTS point and the rate was standardised based on the criteria that one ECTS point corresponds 16 contact hours for both theoretical and experimental courses (except for General Courses) and 10 contact hours for practice courses, as shown in the following revised Table 3-1. The rate, therefore, become more transparent and relatively consistent from one course to another. The corresponding workload for each course is shown in the following Table S3 (also attached as Appendix X) and was revised in the attached module handbook.

Table 3-1 Statistics of study hours with different classifications in four years

Course module	**CPs/proportion**	**Contact hours**	**Self-study hours**	**Total hours**	**Working hours per ECTS point**
Engineering Science Foundation and Technology	25/10.4%	400	350	750	30
Foreign Language	12/5.0%	192	168	360	30
Informatics	4/1.7%	64	56	120	30

E **Comment of the Higher Education Institution (28.01.2022)**

Professional Basics		55/22.9%	880	770	1650	30
Core Professional Courses		20/8.3%	320	280	600	30
Professional Electives		14/5.8%	224	196	420	30
General Courses		19/7.9%	560	18	578	30.4
Experiments and Practice	Experiments	46/19.2%	736	644	1380	30
	Practice	5/2.1%	50	100	150	30
Undergraduate Graduation Project		40/16.7%	400	800	1200	30
Total		**240**	**3826**	**3382**	**7208**	**30**

Table S3 Workload of the curriculum of Applied Chemistry Programme

Competence fields	Module	Type	CP	Contact Hours	Self-study Hours	Workload
Engineering Science Foundation and Technology 25 CPs	Advanced Mathematics A (1)	L	6	96	84	180
	Advanced Mathematics A (2)	L	6	96	84	180
	Engineering Drawing	L&P	2	32	28	60
	College Physics	L&P	5	80	70	150
	Linear Algebra	L	2	32	28	60
	Probability Theory and Mathematical Statistics	L	4	64	56	120
			25	**400**	**350**	**750**
Foreign Language 12 CPs	College English (1)	L	3	48	42	90
	College English (2)	L	3	48	42	90
	College English (3)	L&P	3	48	42	90
	College English (4)	L&P	3	48	42	90
			12	**192**	**168**	**360**
Informatics 4 CPs	Information Technology	L&P	2	32	28	60
	Program Design and Practice	L&P	2	32	28	60
			4	**64**	**56**	**120**
Professional Basics 55 CPs	Analytical Chemistry	L	5	80	70	150
	Inorganic Chemistry (1)	L	5	80	70	150
	Physical Chemistry (1)	L	5	80	70	150
	Inorganic Chemistry (2)	L	5	80	70	150
	Organic Chemistry (1)	L	5	80	70	150
	Physical Chemistry (2)	L	5	80	70	150
	Organic Chemistry (2)	L	5	80	70	150
	Principles of Chemical Engineering	L	5	80	70	150
	Biochemistry	L	5	80	70	150
	Polymer Chemistry	L	5	80	70	150
	Instrumental Analysis	L	5	80	70	150
			55	**880**	**770**	**1650**

Core Professional Courses 20 CPs	The Safety Techniques of Chemical Laboratory	L&P	2	32	28	60
	Structural Chemistry	L	3	48	42	90
	Fine Chemicals	L	3	48	42	90
	Spectrum Analysis	L	3	48	42	90
	Organic Synthesis	L	3	48	42	90
	Materials Chemistry	L	3	48	42	90
	Medicinal Chemistry	L	3	48	42	90
			20	**320**	**280**	**600**
Professional Electives 14 CPs	Bioinorganic Chemistry	L	2	32	28	60
	Surface Chemistry	L	2	32	28	60
	Organometallic Chemistry	L	2	32	28	60
	Electrochemistry	L	2	32	28	60
	Pharmaceutical Analysis	L	2	32	28	60
	Polymer Materials	L	2	32	28	60
	Bioanalysis	L	2	32	28	60
	Modern Separation Technology	L	2	32	28	60
	Professional English in Applied Chemistry	L	2	32	28	60
	History of Chemistry and Innovative Thinking	L	2	32	28	60
	Material Analysis	L	2	32	28	60
	Food Chemistry	L	2	32	28	60
	Inorganic Materials	L	2	32	28	60
			14	**224**	**196**	**420**
General Courses 19 CPs	Morality and Law	L	2	48	6	54
	Military Theory and Training	L&P	1	32	0	32
	Philosophical Foundation	L	1	32	0	32
	Social Practice	P	1	32	0	32
	Music and Art Education	L&P	1	32	0	32
	Socialist Theory	L	1	32	0	32
	Physical Education (1)	P	1	32	0	32
	Physical Education (2)	P	1	32	0	32
	Physical Education (3)	P	1	32	0	32
	Physical Education (4)	P	1	32	0	32
	Chinese History	L	2	48	6	54
	Global Vision	L	1	32	0	32
	Ethics of Science and Engineering	L	1	32	0	32
	Innovation and Practice	P	1	32	0	32
	Economic Management	L&P	2	48	6	54
	Electives	L	1	32	0	32
			19	**560**	**18**	**578**
	Analytical chemistry Experiment	P	4	64	56	120
	Inorganic Chemistry Experiment	P	4	64	56	120
	Physical Chemistry Experiment	P	5	80	70	150

Experiments and Practice 51 CPs	Organic Chemistry Experiment	P	4	64	56	120
	Experiment of Chemical Engineering Principles	P	5	80	70	150
	Biochemistry Experiment	P	4	64	56	120
	Instrumental Analysis Experiment	P	5	80	70	150
	Basic Comprehensive Professional Experiment of Applied Chemistry	P	5	80	70	150
	Professional Experiment of Applied Chemistry (1)	P	5	80	70	150
	Professional Experiment of Applied Chemistry (2)	P	5	80	70	150
	Cognition Practice	P	5	50	100	150
			51	**786**	**744**	**1530**
Undergraduate Graduation Project 40 CPs	Internship	P	15	150	300	450
	Bachelor Thesis	L&P	25	250	500	750
			40	**400**	**800**	**1200**
Total			**240**	**3826**	**3382**	**7208**

3) However, USST must make sure that the actual workload of the students and the awarded ECTS credits correspond with each other and make that information transparent in the module descriptions and the study plans. Furthermore, USST needs to anchor in an official regulation, how many hours of students' total workload are required for awarding one ECTS point and this rate must be the same fixed for every course in the Bachelor's programme Applied Chemistry.

Answer: Thanks for experts' good comments. As mentioned above, the accordance between the actual workload of the students and the awarded ECTS credits are guaranteed with the transparent information in both the module descriptions and the study plans. The workload of a student is the sum of his/her contact hours and self-study hours, and 30 study hours (contact hours and self-study hours) are generally equivalent to one ECTS point for every course in the Bachelor's programme Applied Chemistry, as shown in above Tables 3-1 and S3. According to the curriculum, the average credits are 60 ECTS points and the workload is 1800 study hours for one academic year.

4. (mentioned in Criterion 4.1 Staff)

Due to the Covid-pandemic, international lecturers are currently not able to visit USST and at the same time, international travelling for Chinese students is almost impossible. For this reason, the peers recommend inviting international guest lecturers to give online lectures, so that students get more familiar with the English language and get more insight on current developments in other countries in the area of applied chemistry.

Answer: We greatly appreciate experts' good suggestion. Yes, both the visit of international lectures to USST and the international travelling for Chinese students are currently almost impossible. Inviting international guest lectures to give online lectures is greatly preferred and helpful for students to get more familiar with the English language and more insight on current developments in other countries in the area of applied chemistry. Therefore, we are scheduling a plan of offering students international online lectures at least once per semester by inviting well-known professors as international guest lecturers from oversea universities or institutes like Leibniz-Institut für Katalyse, Max Planck Institute of Polymer Research, Universidad de La Habana, University of Waterloo, North Dakota State University, Temple University, Pacific Northwest National Laboratory,The University of Kentucky, Kyoto University, University of the Fraser Valley, Kanazawa University, University of Tartu, and Okayama University, etc. If possible, we really want to invite Prof. Dr. Veronika Hellwig and Prof. Dr. Carla Vogt to give our students online lectures in the near future.

5. (mentioned in criterion 4.3 Funds and equipment and partly mentioned in the Criterion 2.1 Structure and modules)

However, employers, teachers, and students suggest, in accordance with the peers, purchasing some advanced instruments like a NMR. In addition, the available advanced equipment should be used by the students in the practical courses.

Answer: Thanks a lot! This is really a good suggestion. As mentioned in question 2, USST has purchased some advanced equipment like TEM, NMR and AFM.

For the Applied Chemistry Programme, there is an experimental course called "Professional Experiment of Applied Chemistry (2)", which is set to train students' experimental skills in using the available advanced equipment. In this course, some available advanced equipment has been used like SEM, TEM, GC-MS, ICP-OES, fluorescence spectrometer, QCM-AutoLab electrochemcial workstation, etc. In the near future, NMR and AFM will be used in this course as well.

6. (*mentioned in Criterion 5.1 Module descriptions and partly mentioned in the Criterion 2.2 Work load and credits)*

1) After studying the module descriptions, the peers see that the information about the students' total workload and the awarded ECTS points is not consistent in all cases. For example, this applies to the module "Biochemitsry", "Material Chemistry", the internship, and the Bachelor's thesis. Here, the students' total workload and the awarded ECTS point are not aligned (see criterion 2.2).

Answer: Thanks for experts' good comments! As described in question 3, the information about the students' total workload and the awarded ECTS points has been corrected in all

cases according to Table S3 (Appendix X). We are really sorry for this inconsistencies between the students' total workload and the awarded ETCS point among the module courses.

2) In addition, the peers notice some overlaps in the content. For example, this concerns thermodynamics, which is taught in physics, organic chemistry and physical chemistry and the modules "Module Polymer Chemistry" and "Modern Separation Technology". For this reason, the peers expect USST to update the module descriptions, to check for inconsistencies and to include the information about the students' total workload and the awarded ECTS points.

Answer: According to experts' good suggestion, the module descriptions have been carefully checked and updated to avoid the overlaps in the contents and the inconsistencies among the module courses with the updated information about the students' total workload and the awarded ECTS points provided. Below are the details for removing overlaps among some module courses.

(1) After carefully checking the thermodynamics mentioned in college physics, inorganic chemistry (not organic chemistry) and physical chemistry, the teachers of these courses made a detailed discussion and decided to delete the thermodynamics in inorganic chemistry because of the overlap with that in physical chemistry and keep the thermodynamics in college physics and physical chemistry unchanged. Because the two courses discuss different categories of thermodynamics. Thermodynamics in college physics mainly describes the laws governing the process of conversion of energy, while in the course of physical chemistry, the thermodynamics of chemical reactions is mainly discussed.

(2) The module descriptions of Modern Separation Technology has been well revised in the updated module handbook.

(3) Small amount of overlaps were found in Biochemistry and Bioinorganic Chemistry and the module descriptions of Bioinorganic Chemistry has thus been revised in the new version of the module handbook.

All these updates can be seen in the updated module handbook attached with this report.

7. (mentioned in Criterion 6 Quality management: quality assessment and development)

1) As described under criterion 2.2, it would be useful to include a question in the students' satisfaction questionnaire "Undergraduate Course Teaching Quality Evaluation Form" about how much time students spend on the course in order to determine the students' actual workload for each class.

Answer: As mentioned in question 3, according to experts' good suggestions, a survey questionnaire of students' self-study hours has been made for each course (see the attached Appendix W). Besides, the question "how much time students spend on the course" has been added in the students' satisfaction questionnaire "Undergraduate Course Teaching Quality Evaluation Form" in order to determine the student' actual workload for each class (see the attached Appendix V).

2) As the peers find out during the discussions with the teaching staff and the students, the results of the students' surveys are usually not discussed with the students.

The auditors gain the impression that the survey is mainly used for evaluating the teachers' performance and comparing them with each other in order to assist career development decisions and not for further developing the degree programme. The faculty members confirm that the survey results are taken into account if they want to be promoted (e.g. from associate professor to full professor). The auditors point out that students need to be informed about the results of the questionnaires and that all teachers discuss with them how to improve the course. The aggregated results of the students' surveys are published on USST's webpage. However, the teachers should talk with their students about the results of the questionnaires in the specific course. If there is negative feedback, means of solving the issues should be directly discussed between teachers and students.

Answer: We greatly appreciate the experts' valuable suggestions. The discussion with the students about the results of the students' surveys is really important for further developing the degree programme. In the present, we generally organize the teacher-student discussions about how to improve the courses 1-2 times per semester but the results of the students' surveys for each course are usually not open. The Department of Chemistry will increase the number of the discussions in the following semesters. Currently, students can get the results from the Office of Academic Affairs. We have discussed the experts' suggestions with the Office of Academic Affairs. The office will seriously take some positive actions to make students timely informed with the results of the students' surveys for each course, and officially require teachers to talk with the students about the results of the questionnaires in the specific course, especially, when there is negative feedback, means of solving the issues can be directly discussed in time between teachers and students so as to effectively improve the courses. As suggested, the aggregated results of the students' surveys in each semester will be published by the Office of Academic Affairs on USST's webpage so that students can easily access to the survey results of the courses. All these actions are really essential for forming closed loops of all feedback to further develop the degree programme.

3) USST has established the "Student President Assistants", 10 students represent their fellow students and act as assistants to the university's president by giving suggestions in meetings with different offices. However, the peers think that it would be very useful to institutionalise students' participation in the decision-making processes also on department level. This will increase their involvement in further improving the degree programme.

Answer: Nice suggestion! Four students from each grade have been selected as representatives to participate in the following decision-making processes of the department in order to increase their involvement in further improving the degree programme.

4) During the audit, the peers learn that there is not an advisory board with external stakeholders at the Department of Chemistry, but the department receives a comprehensive programme assessment from the Shanghai Municipal Education Commission every five years ....

Answer: Thanks a lot for experts' good comments! Besides the current involvement from professors and engineers, we are planning to establish an advisory board with external stakeholders at the Department of Chemistry, which contains famous professors and engineers from other universities, institutes, domestic and foreign enterprises. The advisory board will be invited every four years to assess the development of the degree programme and participate in the adjustment of the curriculum.

5) In summary, the peer group confirms that the quality management system at USST is suitable for identifying weaknesses and improving the degree programme. The students are somewhat involved in the process but not all feedback loops are closed.

Answer: According to the experts' valuable suggestions, we have taken and are planning to take some positive actions as mentioned above to significantly increase the students' involvement in improving the courses and the decision-making processes of the department so as to further improve the degree programme based on the closed loops of all feedback.

F Summary: Peer recommendations (16.02.2022)

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

Degree Programme	ASIIN seal	Subject-specific Label	Maximum duration of accreditation
Ba Applied Chemistry	With requirements for one year	-	30.09.2027

Requirements

A 1. (ASIIN 2.2) The students' total workload needs to be verified and aligned with the awarded ECTS points. Follow the respective procedures as mentioned in the ECTS Users' Guide.

A 2. (ASIIN 6) Close the feedback cycles and make sure that all teachers discuss with their students about the results of the questionnaires and what changes might be possible.

Recommendations

E 1. (ASIIN 2.1) It is recommended to further improve the students' active English speaking skills.

E 2. (ASIIN 2.1) It is recommended to pay close attention to new developments and technologies in the area of chemistry (e.g. enzyme chemistry, computational chemistry) and include these subjects in the curriculum. Moreover, students should be better prepared for doing team work.

E 3. (ASIIN 4.1) It is recommended to invite more international guest lecturers to give lectures about current developments in chemistry.

G Comment of the Technical Committee 09 – Chemistry, Pharmacy (01.03.2022)

Assessment and analysis for the award of the ASIIN seal:

The TC sees that the peers were positively surprised by the procedure and the openness of the programme managers. The peers' criticism was received very positively and some of the criticised points have already been corrected. This concerns, for example, the module descriptions, the curriculum and the involvement of the students. This leaves only two requirements, one on the students' workload and the awarded ECTS points and one on the feedback of the results of the teaching evaluations. In addition, three recommendations are suggested.

The TC discusses the procedure and follows the assessment of the peers without making any changes to the requirements and recommendations.

The Technical Committee 09 – Chemistry, Pharmacy recommends the award of the seals as follows:

Degree Programme	**ASIIN seal**	**Subject-specific Label**	**Maximum duration of accreditation**
Ba Applied Chemistry	With requirements for one year	-	30.09.2027

H Decision of the Accreditation Commission (17.03.2022)

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

The AC discusses the procedure and decides to support the proposed requirements and recommendations.

The Accreditation Commission decides to award the following seals:

Degree Programme	ASIIN seal	Subject-specific Label	Maximum duration of accreditation
Ba Applied Chemistry	With requirements for one year	-	30.09.2027

Requirements

A 1. (ASIIN 2.2) The students' total workload needs to be verified and aligned with the awarded ECTS points. Follow the respective procedures as mentioned in the ECTS Users' Guide.

A 2. (ASIIN 6) Close the feedback cycles and make sure that all teachers discuss with their students about the results of the questionnaires and what changes might be possible.

Recommendations

E 1. (ASIIN 2.1) It is recommended to further improve the students' active English speaking skills.

E 2. (ASIIN 2.1) It is recommended to pay close attention to new developments and technologies in the area of chemistry (e.g. enzyme chemistry, computational chemistry) and include these subjects in the curriculum. Moreover, students should be better prepared for doing team work.

E 3. (ASIIN 4.1) It is recommended to invite more international guest lecturers to give lectures about current developments in chemistry.

I Fulfilment of Requirements (22.03.2024)

Analysis of the peers and the Technical Committee (12.03.2024)

Requirements

A 1. (ASIIN 2.2) The students' total workload needs to be verified and aligned with the awarded ECTS points. Follow the respective procedures as mentioned in the ECTS Users' Guide.

Initial Treatment	
Peers	Fulfilled Vote: unanimous Justification: USST has verified the students' workload and implemented some minor revisions in the module handbook and the study plan based on the results
TC 09	fulfilled Vote: unanimous Justification: The TC confirms that the requirement is fulfilled.

A 2. (ASIIN 6) Close the feedback cycles and make sure that all teachers discuss with their students about the results of the questionnaires and what changes might be possible.

Initial Treatment	
Peers	fulfilled Vote: unanimous Justification: Once the collected feedback shows that the teaching of certain course needs to be improved, a teacher-student conversation will be held to discuss what improvements should be implemented.
TC 09	fulfilled Vote: unanimous Justification: The TC confirms that the requirement is fulfilled.

Decision of the Accreditation Commission (22.03.2024)

The Accreditation Commission follows the assessment of the experts and the Technical Committee and decides that all requirements are fulfilled.

The Accreditation Commission decides to award the following seals:

Degree programme	**ASIIN-label**	**Subject-specific label**	**Accreditation until max.**
Ba Applied Chemistry	All requirements fulfilled	-	30.09.2027

Appendix: Programme Learning Outcomes and Curricula

According to the Self-Assessment Report, the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the Bachelor's degree programme Applied Chemistry:

1) Basic scientific literacy and abilities

- Understand and apply general natural sciences to solve practical problems, which are the foundation of professional competence;
- Understand and participate in general industry processes to meet potential positions and technical requirements;
- Understand the development trend of modern science and technology and the corresponding application prospects.

2) Professional competence and capabilities

- Be able to master and use systematic chemistry basic knowledge theory and basic experimental skills;
- Possess strong professional practice and career development abilities;
- Be able to pursue further study, prepare for postgraduate study and engage in scientific research.

3) Engineering thinking and practical ability

- Have basic knowledge of chemical engineering science and technology to solve practical problems;
- Master the production and operation process of chemical products;
- Be familiar with advanced equipment and green technology, and be able to design the process for related products in the chemical industry;
- Have the ability to debug, operate, manage and maintain related equipment based on standards.

4) International communication capabilities

- Be able to access English professional knowledge;
- Be able to communicate with foreign counterparts and study abroad;
- Be able to work and cooperate in foreign or multinational companies with sufficient knowledge of English and foreign cross-cultural background.

5) Team-work and management skills

- Have healthy mind and complete personality;
- Have good sense of law and social responsibility;
- Have high adaptability and good communication skills;
- Have good teamwork spirit and some management skills;
- Have the ability to play a role in the team.

6) Awareness and abilities for lifelong learning

- Have the awareness and ability of independent learning and lifelong learning;
- Be able to adapt to development and knowledge update, technology tracking, and innovation;
- Be able to adapt to the competitive environment and challenging work.

The following **curriculum** is presented:

Competence fields	Module	Type	CP	Hours	S1 CP	S2 CP	S3 CP	S4 CP	S5 CP	S6 CP	S7 CP	S8 CP
Engineering Science Foundation and Technology 25 CPs	Advanced Mathematics A (1)	L	6	96	6							
	Advanced Mathematics A (2)	L	6	96		6						
	Engineering Drawing	L&P	2	32	2							
	College Physics	L&P	5	80		5						
	Linear Algebra	L	2	32		2						
	Probability Theory and Mathematical Statistics	L	4	64			4					
Foreign Language 12 CPs	College English (1)	L	3	48	3							
	College English (2)	L	3	48		3						
	College English (3)	L&P	3	48			3					
	College English (4)	L&P	3	48				3				
Informatics 4 CPs	Information Technology	L&P	2	32	2							
	Program Design and Practice	L&P	2	32				2				
Professional Basics 55 CPs	Analytical Chemistry	L	5	80	5							
	Inorganic Chemistry (1)	L	5	80		5						
	Physical Chemistry (1)	L	5	80		5						
	Inorganic Chemistry (2)	L	5	80			5					
	Organic Chemistry (1)	L	5	80			5					
	Physical Chemistry (2)	L	5	80			5					
	Organic Chemistry (2)	L	5	80				5				
	Principles of Chemical Engineering	L	5	80				5				
	Biochemistry	L	5	80					5			
	Polymer Chemistry	L	5	80					5			
	Instrumental Analysis	L	5	80					5			
Core Professional Courses 20 CPs	The Safety Techniques of Chemical Laboratory	L&P	2	32	2							
	Structural Chemistry	L	3	48					3			
	Fine Chemicals	L	3	48						3		
	Spectrum Analysis	L	3	48						3		
	Organic Synthesis	L	3	48						3		
	Materials Chemistry	L	3	48							3	
	Medicinal Chemistry	L	3	48							3	

	History of Chemistry and Innovative Thinking	L	2	32							4	
	Material Analysis	L	2	32								
	Food Chemistry	L	2	32								
	Inorganic Materials	L	2	32								
General Courses 19 CPs	Morality and Law	L	2	48	2							
	Military Theory and Training	L&P	1	32	1							
	Philosophical Foundation	L	1	32	1							
	Social Practice	P	1	32	1							
	Music and Art Education	L&P	1	32			1					
	Socialist Theory	L	1	32			1					
	Physical Education (1)	P	1	32	1							
	Physical Education (2)	P	1	32			1					
	Physical Education (3)	P	1	32				1				
	Physical Education (4)	P	1	32					1			
	Chinese History	L	2	48				2				
	Global Vision	L	1	32				1				
	Ethics of Science and Engineering	L	1	32				1				
	Innovation and Practice	P	1	32				1				
	Economic Management	L&P	2	48					2			
	Electives	L	1	32					1			
Experiments and Practice 51 CPs	Analytical chemistry Experiment	P	4	3W	4							
	Inorganic Chemistry Experiment	P	4	3W		4						
	Physical Chemistry Experiment	P	5	4W			5					
	Organic Chemistry Experiment	P	4	3W				4				
	Experiment of Chemical Engineering Principles	P	5	4W				5				
	Biochemistry Experiment	P	4	3W					4			
	Instrumental Analysis Experiment	P	5	4W						5		
	Basic Comprehensive Professional Experiment of Applied Chemistry	P	5	4W						5		
	Professional Experiment of Applied Chemistry (1)	P	5	4W						5		
	Professional Experiment of Applied Chemistry (2)	P	5	4W							5	
	Cognition Practice	P	5	4W								5
Undergraduate Graduation Project 40 CPs	Internship	P	15	10W							15	
	Bachelor Thesis	L&P	25	16W								25
CP SUM = 240	CP PER SEMESTER				30	30	30	30	30	30	30	30