



ASIIN Seal

Accreditation Report

Bachelor's Degree Programme

Chemistry

Chemistry Education

Biology

Biology Education

Master's Degree Programme

Chemistry Education

Provided by

Universitas Negeri Yogyakarta

Version: 17 September 2021

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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
Program Studi Biologi	B.Sc. Biology	ASIIN	-	10
Pendidikan Biologi	Bachelor of Education in Biology	ASIIN	-	10
Program Studi Kimia	B.Sc. Chemistry	ASIIN	-	09
Pendidikan Kimia	Bachelor of Education in Chemistry	ASIIN	-	09
Magister Pendidikan Kimia	Ma of Education in Chemistry	ASIIN	-	09
<p>Date of the contract: 16.04.2019</p> <p>Submission of the final version of the self-assessment report: 18.10.2019</p> <p>Date of the onsite visit: 19.-21.11.2019</p> <p>at: Universitas Negeri Yogyakarta, Yogyakarta, Indonesia</p>				
<p>Peer panel:</p> <p>Prof. Dr. Tilman Achstetter, University of Applied Sciences Bremen;</p> <p>Prof. Dr. Angelika Loidl-Stahlhofen, Westfälische Hochschule;</p> <p>Prof. Dr. Dirk Krüger, Freie Universität Berlin;</p> <p>Prof. Dr. Jörn Wochnowski, Technische Hochschule Lübeck;</p>				

¹ ASIIN Seal for degree programmes

² TC: Technical Committee for the following subject areas: TC 09 - Chemistry; TC 10 - Life Sciences.

About the Accreditation Process

Dr. Thomas Steinbrecher, Bildungswerk Nordostchemie e. V.; Muhammad Farisan Auzan, Brawijaya University	
Representative of the ASIIN headquarter: Dr. Martin Foerster	
Responsible decision-making committee: Accreditation Commission for Degree Programmes	
Criteria used: European Standards and Guidelines as of 15.05.2015 ASIIN General Criteria as of 28.03.2014 Subject-Specific Criteria of Technical Committee 09 – Chemistry as of 29.03.2019 Subject-Specific Criteria of Technical Committee 10 – Life Sciences as of 28.06.2019	

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
Biology	Bachelor of Science	-	6	Full time	-	8 Semester	144 credits equivalent to 236.6 ECTS	Annually/ August / 1997
Biology	Bachelor of Education	-	6	Full time	-	8 Semester	144 credits equivalent to 236.6 ECTS	Annually/ August / 1984
Chemistry	Bachelor of Science	-	6	Full time	-	8 Semester	145 credits equivalent to 238.25 ECTS	Annually/ August / 1997
Chemistry	Bachelor of Education	-	6	Full time	-	8 Semester	145 credits equivalent to 238.25 ECTS	Annually/ August / 1984
Chemistry	Master of Education	-	7	Full time	-	4 Semester	42 credits equivalent to 69.02 ECTS	Annually/ August / 2014

For the Bachelor's degree programme Education in Biology the institution has presented the following profile on the programme website (<http://pend-biologi.fmipa.uny.ac.id/en/content/program-objective-and-program-learning-outcome>, accessed 06 December 2019):

„The Program Objective (PO) of Bachelor of Education in Biology

³ EQF = The European Qualifications Framework for lifelong learning

The Program Objective (PO) of Bachelor of Education in Biology of Universitas Negeri Yogyakarta aim for the graduates to:

1. Have the competencies to be creative, and innovative prospective High School Biology teachers/educators who uphold the pious, independent, and intellectual values;
2. Be able to conduct research that contribute to solving the problems in biology education, especially through the development of local wisdom-based learning resources; and
3. Possess entrepreneurial insight and competency whether independently or with others in the field of biology education that are able to contribute to the surrounding community in an accountable, credible, and transparent manner.”

The Program Learning Outcomes (PLO) of Bachelor of Education in Biology

The Program Learning Outcomes (PLO) of Bachelor of Education in Biology of Universitas Negeri Yogyakarta aim for the graduates to:

1. Being pious to God Almighty and upholding humanity values in conducting the duties.
2. Having the attitudes with society, nation, and state values with the foundation of Pancasila.
3. Demonstrating responsibility, independence, entrepreneurship, and adaptation in conducting the duties.
4. Mastering basic biology and other relevant knowledge with mathematics and natural sciences.
5. Understanding the principles of TPACK (Technological Pedagogical and Content Knowledge) in biology learning.
6. Mastering the use of information and communication technology in biology learning.
7. Being able to do independent laboratory work and fieldwork.
8. Being able to plan, implement, assess, and follow up the educational biology learning.
9. Mastering the research methods in biology education as well as its applications.
10. Being able to communicate and collaborate well both verbally and non-verbally.
11. Possessing managerial skill of the profession.
12. Improving the professional expertise through training, work experience or sustainable education. “

For the Bachelor's degree programme in Biology the institution has presented the following profile on the programme website (<http://biologi.fmipa.uny.ac.id/en/content/achievement-graduates-learning>, accessed 06 December 2019):

„Based on the Guidelines for the Preparation of Study Program Learning Outcomes published by the Director General of Belmawa Kemenristekdikti namely KKNI level 6. Learning Outcomes Biology Study Program Graduates are as follows:

1. Have religious values, humanity, and care for the environment.
2. Having a sense of nationalism and responsibility to the country by contributing to improving the quality of people's lives in a civilization based on Pancasila.
3. Obey the law and discipline in social and state life, by internalizing academic values, norms and ethics.
4. Mastering the structure of biology in depth (core biology) to solve problems faced in the field of biology (problem solving) and as capital in mastering other related sciences (related science).
5. Mastering biology laboratory techniques and equipment, as well as mastering the biological scientific methodology used to obtain biological knowledge (how we know what we know).
6. Adaptive, creative, and innovative in applying biology and related sciences
7. Skillfully applying biological techniques in the laboratory and everyday life.
8. Skillful in utilizing local potential according to special interest in the study of biology
9. Able to have a career or create employment / entrepreneurship opportunities in the field of biology
10. Have managerial ability to supervise and evaluate workers under his responsibility, as well as optimize the network of cooperation to develop professionalism
11. Having scientific skills as a supporter of the ability of public speaking in local, national and international forums.“

For the Bachelor's degree programme Education in Chemistry the institution has presented the following profile on the programme website (<http://pendidikankimia.fmipa.uny.ac.id/en/content/learning-outcomes>, accessed 06 December 2019):

„ The learning outcome development of the BEC has met the vision of UNY, namely making piety, independence, and intelligence as the foundational values that are developed in every learning process as seen in the learning outcome. The learning outcomes are grouped into the domains of attitude, knowledge, general skills, and specific skills, as follow:

Attitude

- The graduates of Bachelor of Education in Chemistry demonstrate religious spirit, moral, ethics, and characters of Indonesia in a community, society, and state life
- The graduates of Bachelor of Education in Chemistry demonstrate independence both individual and group work

Knowledge

- The graduates of Bachelor of Education in Chemistry apply the concepts, principles, laws, and theories of mathematics, science, chemistry, education, and chemistry education that are continuously updated as a part of lifelong learning

Specific Skill

- The graduates of Bachelor of Education in Chemistry adapt scientific work skills and chemical learning skills that are continuously updated as a part of lifelong learning to solve problems related to chemistry and chemistry education

Generic Skill

- The graduates of Bachelor of Education in Chemistry adapt the ability for critical and creative thinking in dealing with problems in their careers or personal lives
- The graduates of Bachelor of Education in Chemistry implement cooperative skills in conducting their duties and solving problems “

For the Bachelor's degree programme in Chemistry the institution has presented the following profile in the self-assessment report:

„The PO implementation of Bachelor of Science in Chemistry is to admit Chemistry graduates who have these following skills:

- Having a pious attitude, noble character and personality, independent, responsible, and having a strong spirit of nationalism.
- Having skills and creativity in the field of chemistry so that the graduates are able to compete within the level of Southeast Asia.
- Mastering the knowledge they get from school to develop their expertise in the field of chemistry so that they have competencies in chemistry, and certain chemical specialties.
- Implementing chemical science to support work behaviour in the productive endeavours among society.

- Applying chemistry in national and global community life in accordance with their professions in the field of chemistry. “

For the Master’s degree programme Education in Chemistry the institution has presented the following profile in the self-assessment report:

„MEC offers the student’s possibilities to acquire competences required in positions where chemistry (content knowledge) and pedagogic (pedagogical knowledge) expertise are expected within different operation sectors of the society. The objectives of this programme are that the students can demonstrate adequate knowledge of various chemistry branches and pedagogical knowledge. It is available on MEC, Graduate School, Universitas Negeri Yogyakarta web site: <http://pkim.pps.uny.ac.id/en/programme-objectives>. MEC provides the students with skills to consider the application possibilities of all chemistry branches within various application sectors. The programme objectives (POs) of MEC are to graduate students who are in demand by employers and who lead fulfilling professional careers through their abilities to

- Demonstrate the professional practice skills (pedagogic, personal, social, and professional competencies) needed to be successful in their professional practice;
- Demonstrate the ability to master the theory, principles, and practice of general chemistry;
- Understand the field of chemistry education in terms of terminology from theory and practice, research, curriculum design, and teaching-learning;
- Conduct research, develop and practice in chemistry teaching techniques and methods, so that learning chemistry might be easy and fun;
- Analyze education management policies, curricula, evaluation and teaching technologies related to chemistry learning;
- Apply the knowledge gained from research and discovery in the learning process for instructional development and curriculum;
- Demonstrate the leadership roles in general chemistry education, including specifically leadership in teaching, research, curriculum, and instruction.“

C Peer Report for the ASIIN Seal⁴

1. The Degree Programme: Concept, content & implementation

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

Evidence:

- Objective-Module Matrices for all five degree programmes, provided in the Self-Assessment Report, showcase how each module serves to reach the qualification goals of the study programmes
- Diploma Supplements for all five degree programmes inform about the aim and content of the study programme
- The module descriptions, available for all five study programmes, inform about the aims and content of each single module
- Discussions with representatives of UNY management, programme coordinators, lecturers, business representatives, and students
- The Self-Assessment Report entails details about the objectives of each study programme

Preliminary assessment and analysis of the peers:

For all five degree programmes, UNY has described and published programme objectives and programme learning outcomes. While the programme objectives focus on the vision and mission of the respective degree programme and are rather short and concise, the programme learning outcomes cover a number of specific competencies the students attain in each degree programmes. These are clustered around the following four competencies: Attitudes, general skills, particular skills, and knowledge mastery. The programme ob-

⁴ This part of the report applies also for the assessment for the European subject-specific labels. After the conclusion of the procedure, the stated requirements and/or recommendations and the deadlines are equally valid for the ASIIN seal as well as for the sought subject-specific label.

jectives can be found on the university's website as well as the "Approval Sheet", an institutional summary of each degree programme provided and signed by the Dean of Academic Affairs.

From the documents presented, the peers understand that in the Bachelor of Education in Biology graduates should possess basic knowledge in Biology as well as Mathematics and general Natural Sciences, understand the principles of technological pedagogical and content knowledge in biology education and are capable of using information and communication technology in biology education. Furthermore, the students shall be able to conduct independent laboratory and fieldwork, plan, implement, assess, and follow up the educational biology learning process and master research methods in biology education as well as their applications. In general, all graduates should be socially and ethically responsible, able to communication, collaborate with others, and qualified to continue their education on the next higher educational level.

While the peers agree that this broad qualification in subject-specific as well as pedagogical terms are well suited and adequate to the level 6 of the European Qualification Framework for Bachelor's programmes, they emphasized that this broad approach is very similar to the science track running in parallel they also reviewed. In the Bachelor of Science in Biology programme, students are also supposed to possess a broad knowledge of biology, mathematics and natural sciences, they should be able to master the respective methodologies and make adequate use of laboratories. In comparison to the educational path, the graduates of the science programme should be able to work as entrepreneurs in the field of biology (in the thematic areas of agriculture, fishery, and health products) or continue their education on a higher level. Although the peers do consider the listed competencies to be elementary for a career in biology and they understand that the curricula of the science and the educational paths have a certain congruence (according to the programme managers, about 60% of the curricula are identical), they outline that the described learning objectives in the Bachelor of Science could be more specific. Most importantly, the learning outcomes should make clear in how far the graduates of the science track gain a different, scientifically or academically advanced knowledge that students of the educational path do not gain. On the one hand, this could refer to the economic qualification of the students since they are supposed to work as entrepreneurs and consultants and, on the other hand, this could refer to the emphasis of academic research skills. Graduates of a science track should be better qualified to write scientific articles, present their research to an interested community, and work in international research teams.

In the case of the Bachelor of Education in Chemistry, the students shall gain basic knowledge in chemistry and natural sciences and should be able to "apply the concepts, principles, laws, and theories of chemistry, education, and chemistry education that are

continuously updated as a part of lifelong learning". Furthermore, the graduates should have the necessary skills to work scientifically as well as in the field of education, adhering to modern methodologies and theoretical concepts. In conclusion, the programme aims at bringing forward graduates "with pedagogical, professional, personality, and social competencies, who serve as chemistry learning agents at school, follow the dynamics of chemistry education, apply them in the form of chemical learning innovation, as well as apply information and communication technology in an appropriate and creative way to increase the effectiveness of chemistry education implementation, in addition to analyse and develop chemistry education problem solving strategies in scientific manners."

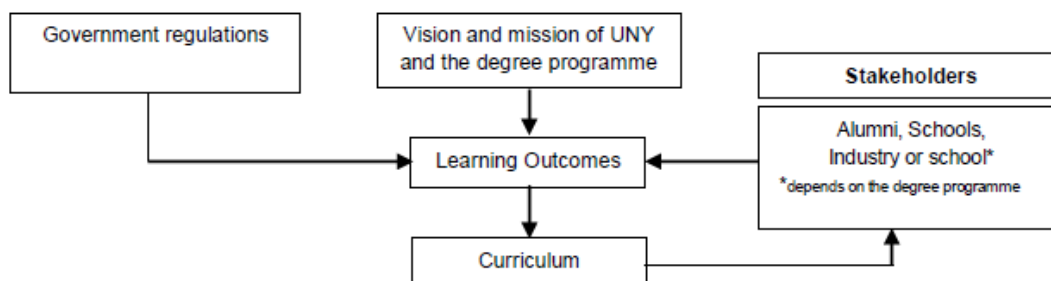
Similarly, in the Bachelor of Science in Chemistry, graduates should know how to apply Information Technology effectively in the scientific field, use various chemical research strategies and techniques to solve chemical problems, be able to follow the development of science and technology as a supporter of lifelong learning processes and analyse the chemical concepts and mind-sets oriented to life skills. In addition, students should develop the skills to apply chemical science to support productive and innovative behaviour, to overcome problems in society, integrate mathematical and scientific concepts to solve problems in chemistry, and have the ability to innovate in chemical research techniques. Again, the peers underline that these learning outcomes could differ more precisely from the skills, which graduates of the educational path have developed. Although in the case of chemistry some more emphasis is already put on the development of research techniques, the peers deem it necessary to define more clearly the special skills and competencies in the field of scientific research and analysis that students of the science track shall acquire.

In the Master of Education in Chemistry the students are supposed to demonstrate their ability to master the theory, principles, and practice of general chemistry and understand the field of chemistry education in terms of terminology from theory and practice, research, curriculum design and teaching-learning. Furthermore, they should be able to conduct research, develop and practice in chemistry teaching techniques and methods, so that learning chemistry might be "easy and fun", analyse education management policies, curricula, evaluation and teaching technologies related to chemistry learning and consequently take over leadership function in the education sector.

The peers discuss with the programme coordinators of UNY how the programme objectives and programme learning outcomes were designed. They learn that they were developed based on the vision of the University and government regulations but especially through the input of relevant stakeholders, such as partners from the industry, alumni, teachers and students. These stakeholders are also involved in the revision of the learning outcomes, the programme objectives as well as the curriculum (cf. criterion 1.3). As such, the study

programme undergoes minor adaptations every year, while big changes, such as the inclusion of new learning outcomes or modules, are undertaken (at the latest) every five years.

UNY provides the following graphic to clarify the process of creating and assessing the learning objectives and the curriculum, respectively:



The peers are very satisfied knowing that the objectives and learning outcomes are continuously updated, and they believe that especially the input of the external stakeholders ensures that students are best qualified for a successful career after graduation. The peers inquire the different employment options for a Bachelor of Education and a Master of Education. They learn that Bachelor graduates are able to teach in formal or non-formal institutions, such as public and private schools and learning centres, and that they may also manage the mentioned educational institutions. In addition to that, graduates of a Master of Education are also capable of researching and developing the education of the respective subject itself and may work for the Ministry of Education or similar governmental agencies. In the discussion with the students as well as the partners from the industry, the peers learn that most students of the educational programmes find employments as teachers in public and private schools or in educational centres. Master students of the educational programmes may also work as lecturers at universities or as educational consultants for the Ministry of Education.

The peers understand that the traditional focus of the University and the programmes lies in the education of educators, not of scientists. As they point out along the learning outcomes of the Bachelor of Science programmes, a stronger emphasis could be put on the scientific qualifications that students develop within these tracks, and that the graduates thus qualify for different career options. In general, the peers encourage the University and programme coordinators to further develop the scientific tracks since not only the Indonesian schools but also the universities are in need of qualified academic staff. This staff shall and must be recruited from among the science track students. Therefore, the introduction of the Bachelor of Science programmes some years ago is considered to be a first step in the right direction. As a next step, the introduction of a Master of Science and even PhD programmes should be the logical consequence. Since the University is in general striving

for more international recognition as well as research activities, the inclusion of Master and PhD science students will be essential to achieve the excellence aimed for. With the support of advanced science students, the academic staff will be able to carry out more research projects, improve the research-relation of their classes and at the same time be more internationally visible than they currently are.

Nonetheless, the peers agree that despite the necessary improvements in the description of the learning outcomes the programmes are generally compliant with the ASIIN Subject-Specific Criteria (SSC) of the Technical Committees of Chemistry and Life Sciences and are equally compatible to the respective levels 6 (Bachelor) and 7 (Master) of the European Qualification Framework.

Criterion 1.2 Name of the degree programme

Evidence:

- The “Regulation of the Minister of Research, Technology, and Higher Education of the Republic of Indonesia Concerning Nomenclature of Study Programs in Higher Education” informs about the regulations for naming any study programme in Indonesia
- Curricula of all five study programmes are in accordance with the contents taught and thus match the title of the programmes
- The Self-Assessment Reports give details about the chosen titles for the respective study programmes
- Discussions with representatives of UNY management, programme coordinators, lecturers, business representatives, and students

Preliminary assessment and analysis of the peers:

In Indonesia, titles for degree programmes are based on a decree by the Ministry of Education and as such follow rules and cannot be awarded at random. The titles for undergraduate programmes are indicated by the acronym “S1”, while graduate degree programmes are labelled with “S2”. Another regulation refers to the categorization of degree programmes in UNY, especially the distinction between “educational degree programmes” and “non-educational degree programmes”. The former are indicated by the term “pendidikan”, meaning “education”, prior to the label of the subject discipline, whereas the title for non-educational degree programmes only contains the name of the discipline. The peers consider the names for all five study programmes to adequately reflect the programmes’ intended aims and learning outcomes as well as their main course language.

Criterion 1.3 Curriculum

Evidence:

- A curriculum for each study programmes allows an overview of the taught contents and how the intended learning outcomes of the programmes are supposed to be achieved
- Objective-Module Matrices for all five degree programmes, provided in the Self-Assessment Report, showcase how each module serves to reach the qualification goals of the study programmes
- The “Academic Regulation Yogyakarta State University Regulation of the Minister of Research, Technology, and Higher Education of the Republic of Indonesia Concerning the National Standards of Higher Education” informs about the regulation for creating and developing a curriculum
- The module descriptions, available for all five study programmes, inform about the aims and content of each single module
- Discussions with representatives of UNY management, programme coordinators, lecturers, business representatives, and students
- Self-Assessment Report explains in detail how the curriculum was created and is constantly developed

Preliminary assessment and analysis of the peers:

The curricula of the degree programmes are designed to comply with the programme objectives and programme outcomes, they are subjected to constant revision processes (cf. graphic under criterion 1.1). As such, the curricula are recurrently reviewed and commented on by students and teachers as well as by external stakeholders such as alumni or partners from the industry. Regular changes are made to ensure that the curricula are up to modern standards.

There exist three rules with regard to the development and structure of the curriculum. The first refers to the review-process of the curricula already discussed prior. The second sets the minimum number of credit points and the third the construction of the curriculum with regard to certain contents. As such, the curriculum of an undergraduate programme in Indonesia must contain 144 Indonesian credits (sks) or 237 ECTS, whereas the curriculum of graduate programmes must contain 42 sks (69 ECTS), so that in total at least 300 ECTS are reached when completing both, a Bachelor’s and a Master’s degree programme. With regard to the general rule covering the construction of the curriculum, Bachelor’s degree programmes in Indonesia must entail 22 sks of university and faculty common courses, 2

sks community service, and 8 sks of common basic educational courses. For the Master's degree curriculum students solely have to take 2 sks of common courses.

Generally, the curricula of the Bachelor's degree programmes consist of 8 semesters, each with a duration of 16 weeks. The first six semesters contain so-called common courses, basic educational courses, as well as specific courses dependant on the chosen degree programme. The seventh semester entails the community service of the students as well as an internship. The eighth semester is dedicated to the undergraduate thesis. The common courses are set by the university and are mainly designed to achieve learning outcomes within the attitudes domain as well as generic skills of the students such as English speaking competencies.

In the Biology Education programme the students take 8 credits in Basic Education Courses after completing the Compulsory University Courses. This is followed by 42 credits in Common Ground Courses in Biology, before the main part of 65 credits is taken in Education in Biology Specific Courses, divided into 38 credits of biology courses and 27 credits of biology education courses (for the available courses refer to the Appendix). The Bachelor of Science programme follows generally the same structure but the special credits in biology education are substituted by other subject-specific courses in the final semesters. 12 credits refer to elective courses that can be taken by the students in order to develop individual specializations. Options form the fields of Botany, Zoology, Microbiology, and Biotechnology. Ecology and Environmental Sciences and Aquatic Biology are also available to the students. In general, the peers agree that the presented Biology curricula are adequate to achieve the described learning outcomes but they do see some room for improvement in the years to come. Discussions on site revealed that aspects of Bio-Informatics are not included in the curricula while topics of Molecular Biology and Cell Biology should be further strengthened. The peers understand that, due to the great variety of biological topics, it is difficult to include all aspects but they detect certain redundancies in the field of Organismic Biology. It could thus be an option to reduce the currently available courses on this subject in order to create space for new modules dealing with molecular biology.

In Chemistry, the structure of the curricula is very much the same as in Biology. Students of the education branch take 69 credits in chemistry and 29 credits in chemistry education including two pedagogic internships. In the science track the students have to earn 56 credits in common ground, 55 credits in compulsory courses, and 12 credits from electives. In the Chemistry curricula the peers could not detect any very important missing subjects that should be added in the near future. Only a basic education module in Informatics could be helpful for the students.

The Master programme in Chemistry Education includes 7 credits in Scientific Foundation, 18 credits in chemistry-related pedagogy, 11 credits in chemistry, and 4 credits from electives. Students who have not previously completed an educational Bachelor programme have to take additional 9 credits in pedagogic foundations.

The peers also discuss the practical experience of the students. They learn that all Bachelor students have to undertake a community service that is mandatory in Indonesian HEIs and that is aimed to provide experiences to apply their knowledge while at the same time supporting Indonesian society. As such, during the Community Service, students live and work mostly in rural or sub-urban areas for four to five weeks and support the local societal needs. Unlike the Community Service, the educational internship of the Bachelor's degree programme in Education is conducted at partner schools for the duration of three months and allows students to gain knowledge about designing lesson plans, teaching in a real classroom environment, and to perform classroom assessments. Each of the internships is supervised by one representative from UNY to ensure that students gain the necessary skills.

Apart from the internships, the students of all programmes participate in a broad variety of practical laboratory work throughout their curricula. The peers learn from the students and teaching staff that practical work is usually done in groups of about five students following the instructions of the lecturer. They point out that under the given circumstances, the practical experience of the individual is mostly limited to observing and imitating leaving little room for experiences and even making mistakes in experiments and learning from them. First, the peers recommend creating a practice environment where the maximum size of student teams is limited to two or three students and groups with up to 15 students, thus ensuring that each student can actually participate actively. As a second step, the peers suggest that more practical analytical work could be changed to a form of a self-assurance process, allowing for an independent exercise of the student working on the experiment. Eventually, the graduates should not only be able to explain and follow the demonstrated experiment but to answer individually questions about the analysed material, its form and quantity, and to offer suggestions concerning the most appropriate approach regarding analytical quality, use of time, and cost of procedure. Each analysis system should be tested by the students themselves concerning its specification and performance. Consequently, the students should have gone through a system's training with the respective analysis system, analysing first artificial samples and later real samples. This analytical process might comprise the sampling process, the sample preparation, as well as the proper analysis performance and successive evaluation. By implementing such a procedure, the students would get acquainted with the whole analytical as well as the quality assurance process within an analytical laboratory through hands-on experience. Such an

experience cannot be gained, in the opinion of the peers, by simple demonstration and imitation. These suggestions may be a starting point for a long-term development of the practical education within the programmes.

In summary, the peers consider the curricula of the reviewed degree programmes to be generally up to date with some exceptions in the biology and biology education programmes. Again, the peers emphasize that especially for the Bachelor of Science programme it is important to cover not only the broad topics of Biology but also to include modern aspects such as Bio-Informatics and Molecular Biology.

Criterion 1.4 Admission requirements

Evidence:

- The „Academic Regulation Yogyakarta State University”, the “Regulation of the Minister of Research, Technology, and Higher Education of the Republic of Indonesia Concerning the National Standards of Higher Education” and the “Government Rule – National Student Admission” inform about the admission requirements and procedures at UNY and especially for the five study programmes
- A Student Admission Brochure details the process of admission for interested students
- Discussions with representatives of UNY management, programme coordinators, lecturers, business representatives and students
- Self-Assessment Report explains in great detail the admission process and its requirements

Preliminary assessment and analysis of the peers:

Student admission for all degree programmes at UNY is managed through the admission office. Regarding the admission process itself, different systems are applied for undergraduate programmes and graduate programmes. For the undergraduate programmes, there exist three pathways for student admission:

1. SNMPTN (National Entry Selection of Public Universities), based on academic performance during high school (40%)
2. SBMPTN (Joint Entry Selection of Public Universities), based on a nationwide selection test that is held every year for university candidates (40%)
3. Mandiri Selection (Local admission), these students are selected under special consideration of their education, local origin, social background, achievements in sports or science, and financial means

In order to be admitted to the Master of Education programme in Chemistry applicants need to have completed a Bachelor degree programme in Chemistry or Chemistry Education with a minimum GPA of 2.75. Further, they have to possess adequate English language skills with a TOEFL score of 450. Additionally, all applicants have to pass an entrance examination including tests of the academic potential and the English language skills. Applicants from the Bachelor of Science programme have to take the matriculation stage conveying basic pedagogic skills and competencies which graduates from the Bachelor of Education have already acquired.

All information regarding admission, including its requirements and its procedures, are available on UNY's website and are anchored in the "Academic Regulations of UNY" and the "Government Rules – National Student Admission", among others. 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:

From the comments of the University the peers understand that a review of the B.Sc. programmes in Biology and Chemistry will take place, leading also to a more precise definition of the special skills and competencies students of the science track shall acquire. This is approved by the peers, however they maintain uphold their remark until the curriculum has been reviewed accordingly.

Concerning the strengthening of Informatics contents in the Biology programme it is further outlined, that a Digital Transformation course has been added in order to provide the students with basic Informatics skills. There, the use of basic applications to make the structure of chemical compounds through Chemdraw and Hyperchem, as well as the application of data for research in the field of chemical computing will be conveyed. The peers appreciate these initiatives; their outcome should be reviewed during a possible re-accreditation procedure in some years.

Similarly, the UNY announces that the detected redundancies in Organismic Biology will be avoided by introducing new modules on Bio-Informatics as well as Cell and Molecular Biology. Again, the peers approve these envisaged modifications but maintain their comments until the announced changes have been initiated.

Furthermore, the programme coordinators declare, that they will consider to reduce the number of participants in laboratory work groups as they understand the peers' recommendation that this may enhance the students' scientific and analytical skills. Similarly, they coordinators see the necessity to further strengthen the students' practical analytical

skills although they do emphasize that analytical works are already part of several courses, for example chemistry and research methodology in Chemistry.

In conclusion, the peers appreciate that many of their comments have been taken up positively. Until the announced modifications are initiated they consider the criterion to be partly fulfilled.

2. The degree programme: structures, methods and implementation

Criterion 2.1 Structure and modules

Evidence:

- Objective-Module Matrices for all five degree programmes, provided in the Self-Assessment Report, showcase how each module serves to reach the qualification goals of the study programmes
- The module descriptions, available for all five study programmes, inform about the structure of the modules
- The curriculum of each study programme showcases its structure
- The “Regulation of the Minister of Research, Technology, and Higher Education of the Republic of Indonesia Concerning the National Standards of Higher Education” inform about the structure of each study programme.
- The “Academic Regulation Yogyakarta State University” as well as the “Regulations regarding student mobility” inform about student mobility and credit transfer.
- The Self-Assessment Report delivers information about the structure of the programmes as well as student mobility
- Discussions with representatives of UNY management, programme coordinators, lecturers, business representatives, and students

Preliminary assessment and analysis of the peers:

After analysing the module descriptions and the study plans the peers confirm that all degree programmes under review are divided into modules, and that each module is a sum of coherent teaching and learning units. All working practice intervals (Community Service and internships) are well integrated into the curriculum, and the supervision by the faculties allows for their respective quality in terms of relevance, content, and structure. In addition, the peers gain the impression that the choice of modules and the structure of the

curricula ensure that the intended learning outcomes of the respective degree programme can be achieved.

To allow students to complete the degree without exceeding the regular study duration, the courses are distributed proportionally over eight semesters (in the Bachelor) by considering prerequisites for higher-level courses. In addition to prerequisites, a balance between the different types of courses (e.g. common courses, educational courses, subject-specific courses) is also considered.

After analysing the curricula, the peers notice that each module consists of one course and that therefore there exist many small modules. UNY states that they are in the process of creating a more compact curriculum based on the example of the European model, yet this may take some time. The peers worry about the number of exams the students thus have to take and inquire whether there have been any complaints by the students. The programme coordinators deny this (cf. criterion 3). To minimize the workload, however, it is guaranteed that no more than two exams are held per day. The peers generally regard the module structure as sufficient, yet they urge UNY to create more compact modules to reduce the number of exams.

International Mobility

According to the peers, international mobility, although actively promoted by the programme coordinators, is still very limited. UNY tries to promote international mobility by offering scholarships and creating partnership agreements with other universities. So far, there exist over 60 partnership agreements with national and international universities, although all of them are within Asia. The peers are glad that UNY offers support to the students with regard to studying abroad, yet the numbers remain low in comparison to the number of students enrolling each year. The respective faculties have recognized that there is a serious need for increasing the academic mobility of their own students and, at the same time, for attracting more international students. The peers support the first steps undertaken (scholarships and implemented partnership agreements), but are convinced that even more measures must be taken in order to support the internationalization of UNY, especially since UNY aims at becoming an internationally recognized university. For example, there should be more classes taught solely in English and more partnerships agreements could be undertaken, especially with countries outside of Asia.

The peers inquire whether offering more courses taught in English would help to attract more international students. UNY agrees with that assessment and states that it is in the process of creating more courses in English but that they also offer courses for international students to learn Bahasa Indonesia. The peers appreciate that a variety of courses are already taught bilingually and that during their appointment procedure, lecturers have to

prove their English-speaking capabilities.

The peers appreciate the effort to foster international mobility and support the faculties in further pursuing this path.

Criterion 2.2 Work load and credits

Evidence:

- The module descriptions for each study programme inform about the work load and credits of each module
- The “Academic Regulation Yogyakarta State University” informs about the regulations and restrictions for work load and credits in Indonesia
- Curricula for all five study programmes detail the amount of credits to be gained in each semester
- A document regarding the transcription of Indonesian Credits (sks) to ECTS allows for an understanding of the workload and credits
- Discussions with representatives of UNY management, programme coordinators, lecturers, business representatives, and students

Preliminary assessment and analysis of the peers:

According to Indonesian regulation, each undergraduate degree comprises 144 sks over the span of eight semesters while each graduate degree covers 42 sks in four semesters. According to the Academic Regulations of UNY, 1 sks is equivalent with 170 minutes of student activity per week within one semester. As there are 16 weeks of academic activity per semester, 1 sks amounts to 47.72 hours of student activity per semester. When converting to ECTS 1 ECTS equals 26 hours of student activity per semester, which the peers deem sufficient. The peers further confirm that the workload in hours is indicated in the module descriptions and the distinction between classroom work and self-studies is made transparent and is in line with the credits awarded.

With regard to the distribution of the workload over the span of the semesters, the peers learn that for the Bachelor’s degree programmes, the first six semesters hold approximately 20-21 sks while in the seventh semester, there are 14 sks of courses, including 6 sks for the internships, and in the eighth semester, students only take 6 sks for their undergraduate thesis. The programme coordinators state that fewer credit points in the last two semesters allow students to finish their studies on time. In addition to distributing the credits proportionally across the semesters, there are regulations in place that avoid students having a workload that exceeds their abilities. Here, the GPA of each student defines the

maximum credits they may take in the upcoming semester. For example a student with a GPA of less than 2.00 may take 18 sks while a student with a GPA of more than 3.00 may take 24 credits. This way, it is also possible that extremely good students will finish their studies ahead of time. While an unusual approach, the peers see that this is a standard at most Indonesian universities and they agree that in this way students are encouraged to finish the studies on their own time instead of having to drop out due to an unbearable workload. To ensure that even the students who are only allowed to take 18 sks per semester may finish their studies on time, remedial programmes are offered. The peers appreciate this effort.

The peers learn, however, that systematic monitoring and evaluation of the actual workload is not yet conducted so that there is only limited information available on the conformity between the theoretical and the actual workload. The programme coordinators admit that they see a need to measure the actual workload. The peers thus urge UNY to implement a workload analysis quickly, e.g. as part of the already conducted course evaluations.

During the discussions with the students, the peers learn that they deem the workload as well as the number of exams to be adequate and that they still find time to develop their individual interests and skills outside of the university by working or taking extracurricular classes.

The peers believe the overall workload to be manageable, especially since nearly all students graduate on time. Yet, they urge UNY to conduct workload analyses to ensure that the actual workload matches the awarded credit points.

Criterion 2.3 Teaching methodology

Evidence:

- The module descriptions inform about the teaching methodology applied in each module
- The Self-Assessment Report delivers details about the didactical methods applied in the five degree programmes
- Discussions during the audit, especially with lecturers and students, allow an insight into the teaching methodology actively applied

Preliminary assessment and analysis of the peers:

UNY has implemented various teaching and learning methods, which mainly focus on student-centered learning. As such, the use of teaching methodology and media are adjusted

to the characteristics of each course and its learning objectives and learning outcomes. The peers are especially impressed with the Micro-Teaching Lab, which allows teachers to record students holding a simulation lecture so the students' performance which can later on be assessed in detail.

To improve the flexibility of learning processes and the interaction between students and lecturers, UNY has also launched "Be-Smart", an online platform designed for e-learning activities. More and more courses are added to this platform offering material or additional information and exercises online. As Be-Smart is a relatively new platform, all teachers are currently receiving training on how to utilize it. Those that have finished their training will then upload their modules' teachings and documents to the platform. The programme coordinators state that currently, Be-Smart is still a work in progress but they are confident that within the next year all modules will have been uploaded. They assert, however, that Be-Smart is only used in addition to traditional face-to-face lectures.

In summary, the peers are very impressed with the various teaching methodologies, both traditional and modern, that are utilized in the five degree programmes under review. They deem them suitable to support the students in achieving the intended learning outcomes.

Criterion 2.4 Support and assistance

Evidence:

- The Self-Assessment Report provides an overview of the programmes implemented and the measures taken to support students
- Discussions during the audit, especially with the programme coordinators and the students, allow an insight into the assistance provided in the four study programmes

Preliminary assessment and analysis of the peers:

In order to support students in completing their studies on time with good achievements, the university and the faculty provide academic and personal support and assistance through various means: First, students are appointed an academic supervisor during their first semester, which supports them with devising their study plan and monitors the student's academic progress. Additionally, each student is also appointed a thesis supervisor, who supports him or her in the process of writing the undergraduate thesis. Second, there exist special supervisors who help those students that are interested in extracurricular activities related to their studies. The peers appreciate, that each student has one personal supervisor that aids him or her throughout the entire studies and also that the university provides support for those extracurricular activities that can further the students' career.

In addition to the aforementioned academic support, UNY also provides student counselling services and medical center services for personal problems a student might face. Students' interests and talents are furthermore facilitated through several centers, such as the career development center or the scholarship information portal. In order to provide students with sufficient information about the available support and assistance, UNY distributes a Student Handbook that is regularly updated. All necessary information can also be found on UNYs websites.

The peers notice the good and trustful relationship between the students and the teaching staff; there are enough resources available to provide individual assistance, advice, and support for all students. The support systems help the students to achieve the intended learning outcomes to complete their studies successfully and without delay.

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

Concerning the internationalization process at UNY the coordinators comment that the possibility will be reviewed to offer more courses in English and that some action in order to increase the international mobility have already been initiated in the aftermath of the ASIIN site visit. As such some new MoU's have been signed with more partner universities in Asia, Europe, and the USA. UNY will also make further arrangements to increase the number of student and staff mobility with universities in Europe and/or the USA.

With regard to the assessment of student workload it is pointed out that a student workload survey actually has already been conducted by a number of study programmes. For example, the B.Sc programme in Chemistry has asked its students to do this survey. The survey seeks the time allocation that is spent in doing assignments, for independent study, and the time students spend involved in the students' organisations. The results of the survey show that the workload as well as the number of exams to be adequate and that they still find time to develop their individual interests and skills outside of the university by working or taking extracurricular classes. However, this survey is not yet mandatory for all study programmes at UNY. Consequently, the peers maintain their remark that a mechanism should be installed evaluating the student workload in all programmes under review on a regular basis.

In conclusion, the peers consider the criterion to be partly fulfilled.

3. Exams: System, concept and organisation

Criterion 3 Exams: System, concept and organisation
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Evidence:

- The module descriptions inform about the examination of each module
- The “Academic Regulation Yogyakarta State University” as well as the “Regulation of the Minister of Research, Technology, and Higher Education of the Republic of Indonesia Concerning the National Standards of Higher Education” determine the rules and regulations of examination in all five study programmes
- Exemplary examination schedule
- Final Task Guidebook and Final Task Assessment Book showcase the regulations and requirements but also the guidelines and assistance with regard to the students’ final task
- The Self-Assessment Report gives details about the forms of exams utilized in the five study programmes
- Examinations and final theses were provided during the on-site visit
- Discussions with representatives of UNY management, programme coordinators, lecturers, business representatives, and students

Preliminary assessment and analysis of the peers:

At UNY, assessment is conducted according to the regulations defined in the Quality Assurance of Assessment as well as the Academic Regulations. Each course determines course objectives to support the achievement of the programme learning outcomes. Accordingly, each course must assess whether all defined learning outcomes stated in the module description have been achieved. If a student fails an exam, he or she may repeat it, either within the semester (in the case of failed mid-term exams), after the end of the semester (in the case of failed final exams), or during the next semester. There is no limitation on how often an exam can be re-taken.

The assessment system at UNY has two purposes: a formative and a summative purpose. The formative assessments are used by the lecturer to monitor the progress of achieving the course objectives and usually take place in the middle of the semester. If the lecturer notices that students are not able to achieve the course objectives to the fullest, he or she will adapt the taught contents accordingly. The summative assessments are used to display whether the course objectives have been met at the end of each semester.

All final exams take place within a certain timeframe at the end of each semester. This timeframe (exam weeks) is communicated at the beginning of each academic year. Before the exam week there is a preparatory week offered for students to prepare intensively for their final exams. About two weeks prior to the exam weeks, a detailed schedule is published that informs about the exact time and date when each exam takes place.

During the first meeting of each course, the students are informed about the form, the date, the relevant regulations, and the weight of the individual exam for the final grade. Assessment of the students' attitudes, which are part of the overall programme learning outcomes, are conducted through observation and documentation by the lecturers. Assessments of knowledge are conducted via quizzes at the end of each unit as well as mid-term and final exams. Assessments are carried out in various forms such as written tests, oral presentations, or projects.

The students confirm that a variety of assessment methods is used, including traditional methods such as written or oral exams, but also presentations or project reports are utilized. Next to the mid-term and the final exams, students also have some quizzes and projects throughout the semester that all count towards the final module grade. The peers calculate, that students have on average 36 examinations per semester. While the students do not complain about this immense workload, the peers nonetheless believe it to be beneficial to reduce the number of quizzes/exams and to allow students more time in between the mid-term and the final examination.

During the on-site visit, the peers review a variety of Bachelor and Master theses and come to the conclusion that these are generally acceptable although the level of scientific analysis could still be improved. The peers understand that the primary focus of the programmes lies on preparing the students for educational service and they learn from the employers that the graduates of the respective programmes are seen to be well qualified for this task. However, with regard to the Bachelor of Science programmes and taking into consideration that the research activities at the University shall be strengthened in the future, the peers point out that the analytical skills of the students could be further developed. Under criterion 1.3 it has already been outlined how the curriculum could take better into account the research aspect in the respective programmes. In addition, the peers would like to suggest that the scientific relevance of the students' research projects could be enhanced by clustering them more into certain fields or topics of relevance for the respective department. In order to further the research activities of students as well as staff members and their analytical potential the peers see the opportunity to involve the students actively in parts of larger projects that have thus been clustered. As an example, a professor could develop a project, identify a variety of small analytical exercises that could be distributed to a number of individual students who work on these problems as their Bachelor thesis. In the longer term, they could even be supervised and actively supported by Master and PhD students, who pass down their experience and knowledge pertaining scientific writing and analysis while at the same time taking advantage of the Bachelor students' contributions.

The peers conclude that the criteria regarding the examination system, concept, and organization are fulfilled and that the examinations are suitable to verify whether the intended learning outcomes are achieved or not. They recommend, however, to reduce the number of quizzes so students have more time to prepare for the mid-term and final examinations. Furthermore, the aspects of scientific analysis could be strengthened as a part of the general on-going process of increasing the research capacities in the reviewed programmes.

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

In their comments on the report the programme coordinators point out that the number of examinations is currently following the traditional Indonesian standards. However, as they are aware of the need to restructure their curricula based on the peers' recommendations that will also review the suitability of the exam distribution in order to reduce the students' work load.

In conclusion, the peers consider the criterion to be largely fulfilled.

4. Resources

Criterion 4.1 Staff

Evidence:

- A Staff Handbook for all five degree programmes informs about the composition of the staff as well as its capacity
- The "Government Rule – Teacher and Lecturer" details the regulations for teachers and lectures
- The Self-Assessment Report gives details about the members of staff and their tasks
- Discussions during the audit, especially with the members of staff as well as the students

Preliminary assessment and analysis of the peers:

At UNY, the staff members have different academic positions. There are professors and lecturers. The academic position of each staff member is based on research activities, publications, academic education, supervision of students, and other supporting activities. For example, there are lecturers who hold a Master's degree and lecturers who hold a PhD

degree. The latter may become professors once they have earned a certain amount of credits with regard to their academic work. In addition, the responsibilities and tasks of a staff member with respect to teaching, research, and supervision depend on the academic position.

In the Bachelor of Biology Education, currently 20 staff members are involved with a teacher-student ratio of 1:13; in the Bachelor of Science in Biology, the number of staff members is 19, amounting to a ratio of 1:19. In the Bachelor of Education in Chemistry, there were 35 lecturers in 2018, reaching a teacher-student ratio of 1:7, in the Bachelor of Science 34 lecturers provide a ratio of 1:16. In the Master programme there are 15 full-time lecturers involved which have been supported between 2015-2017 by at least 16 international guest lecturer in order to enhance the teaching level and ratio. Without the guest lecturers a ratio of 1 lecturer to 16 students has been achieved.

In summary, the peers confirm that the composition, scientific orientation and qualification of the teaching staff are suitable for successfully implementing and sustaining the degree programmes. The auditors are impressed by the excellent and open-minded atmosphere among the students and the staff members. It is supported by an extensive advisory system, which ensures that every student has an academic advisor. This atmosphere of understanding and support is one of the strong points of the degree programmes.

Criterion 4.2 Staff development

Evidence:

- A Staff Handbook for all five degree programmes informs about the composition of the staff as well as its capacity
- The “Government Rule – Teacher and Lecturer” details the regulations for teachers and lectures
- The Self-Assessment Report gives details about the members of staff and their tasks
- Discussions during the audit, especially with the members of staff as well as the students
- Example of Certificates of Internal Educational Programmes of staff members
- Examples of Certificates for Attending International Conferences of staff members

Preliminary assessment and analysis of the peers:

According to the self-assessment report, staff-development is carried out on a regular basis to improve the quality, competence, and performance of the teaching staff. The staff-de-

velopment activities include guest lectures, research and publication, monitoring and evaluation. For example, UNY regularly holds a so-called coaching clinic to assist lecturers in applying for a doctoral degree or it offers English courses to improve these language skills. With regards to educational training, there exists a variety of courses, for example the IOT-Programme (Internet of Things), which educates lecturers in utilizing new computer programmes, such as the online-platform Be-Smart.

With regard to research activities, all lectures have the opportunity to apply for grants, which they usually receive from the government. Furthermore, the university holds coaching for lecturers aiming to participate in international conferences or increasing their academic writing skills. During the on-site visit, the peers saw some samples of the lecturer's research, in form of books or journal articles. They were very impressed that the teachers tend to include students into their research work, thus effectively merging their research and teaching responsibilities.

The peers ask, whether lecturers have the possibility of taking a sabbatical. They learn that a sabbatical has just recently been implemented by the Indonesian Ministry of Education so that from now on, lecturers may spend 4-6 months abroad or in the industry while receiving their full salary.

In summary, the peers confirm that UNY offers sufficient support mechanisms and opportunities for members of the teaching staff who wish to further develop their professional and educational skills. Nevertheless, they make the point that for reasons of internationalization the University should emphasize the importance of continuously improving the average English language skills among the teaching staff.

Criterion 4.3 Funds and equipment

Evidence:

- The Self-Assessment Report informs about the funding and equipment of the five degree programmes
- On-site visit of laboratories, seminar rooms, and library

Preliminary assessment and analysis of the peers:

As UNY is a public university, it is funded by the Indonesian government as described in the Activity and Budget Plan (RKA). The funds noted in the RKA consist of three components: funding for education and teaching as well as research and service; financing of human resources development, and development of scientific and student activities. In the Self-Assessment report, UNY provides information about the funding each degree programme

has received within the last three years. The peers assess a stable financial stream for the degree programmes as well as an overall satisfactory amount.

During the on-site visit, the peers closely inspect the available infrastructure, especially the classrooms and laboratories of the respective programmes. Regarding the pedagogic education, they appreciate that the programmes provide modern and innovative equipment such as the video-lab, where students can present in front of peers while being videotaped. Through the analysis of the previously recorded material, the students can then discuss their way of presentation and learn from the others. Concerning the analytical laboratories, the peers are also impressed by the fact that some new labs have only recently been built on campus and dispose of the most modern equipment that can be used for advanced research projects. Taking into account that the University aims at developing its research activities and that the introduction of further Master and PhD programmes is envisaged, this highly sophisticated equipment is clearly necessary. For the education on a Bachelor level, however, it becomes apparent that the new equipment is not used regularly since access is currently restricted to a limited number of students.

When visiting the teachings labs where the elementary courses of the Bachelor programmes are being taught, the peers realized that certain improvements must be undertaken in order to meet international standards. From the discussion with the teaching and laboratorial staff the peers learn that the laboratories and their equipment do comply with national Indonesian standards. Nevertheless, in order to comply with international expectations the peers deem it necessary that certain elements are to be improved in the near future. After the visit, the peers emphasize that significant improvements need to be made in terms of laboratory safety. As a minimum standard, some biological laboratories should be compliant with the S1-Safety level. Some of the following aspects regarding safety issues could be done easily and without major financial effort:

All wooden material, equipment, and furnishings should be banned from the labs, and emergency showers above the doors and eye showers have to be installed. It must be ensured that within each laboratory a fire extinguisher is installed as well as first-aid-equipment. In addition, each laboratory should have a closed, chemical resistant closet where the chemicals are being deposited while not in use. Similarly, all solvents must be placed in specific ventilated closets where only a restricted amount of solvents is stored; higher amount of solvents should be deposited separately in a sealed room of the University. At best, four or five fume hoods need to be installed in each lab and a secure disposal of chemicals as well as biological waste has to be ensured. In this context, solvents, strong acids, and heavy metals need to be disposed separately and organic liquids need to be disposed of in specific vessels. In addition to these material requirements the peers point out that (micro)biological laboratories and food chemistry labs need to be clearly separated

from each other: Nothing that is being produced in a microbiological laboratory should ever be consumed as food or drink. The thus established safety zone (S1) should be supervised by one dedicated safety zone manager who is responsible for the annual review of all safety measures, maintenance of safety equipment, and definition of a quality assurance process in terms of work place safety.

Apart from these immediate improvements regarding safety the peers identify some elements in both, biology as well as chemistry laboratories that should be installed within the next years. They ask the University to define an acquisition plan outlining how the missing elementary equipment will be provided within the next five years.

In chemistry the study labs should provide at least porcelain crucibles, Bunsen burners, a nitrogen gas pipe, burette stands, desiccators, adequate glass vessels (Erlenmeyer flasks, round flasks, flasks for distilled liquids, etc.), hot plates, waterjet pumps, vacuum pump, rotary evaporator, refractometer, and infrared spectrometer.

In Biology, the study laboratories should provide at least Bunsen burners, Vortex machines, methods for cell disruption, a refrigerated centrifuge (a small one and one of medium size), automatic pipettes (at least 5-6 sets per lab), adequate glass vessels (Erlenmeyer flasks, round flasks, flasks for distilled liquids, etc.), one-way-materials for the use of the respective equipment (Eppendorf tubes, pipette tips, etc.), at least two UV-Vis-spectrophotometers per lab, electrophoresis devices (at best 5 or 6 per lab) for DNA and protein analysis, one or two PCR machines, chromatography columns for protein purification as well as for DNA isolation, ELISA reader, light (phase contrast) microscopes (at least 6 for microbiology), a haemocytometer, incubators and incubator shakers, refrigerators, and freezers (2-3 for -18° C) in adequate numbers for organismic material and (bio)-chemicals.

Taking into account that the research activities shall increase during the years to come, the peers also see some elements that should be added in the research laboratories although this is not of primary importance. Thus, in chemistry, students should have HPLC, AAS, NMR, mass spectrometry, and gas chromatography at their disposal while in biology an ultracentrifuge, a fluorescence microscope, a cold-storage room, FPLC, FACS and a -80° deep freezer should be provided. As mentioned before, these last elements are mere suggestions for improvement if the University continues to develop its offers on Master and especially PhD level.

In conclusion, the peers see that the University aims at improving the laboratory equipment and thus closing the existing gap to international standards. Significant improvements have already been made. Nevertheless, the importance of safety in the lab environment cannot be exaggerated and the peers underline that the points listed above should be addressed immediately. This is certainly of importance for the development of scientific research but

equally important for the education of future biology and chemistry teachers. The peers express that in order to teach students at school the relevance of safety standards they must have experienced them themselves starting from their first semester onwards. As they clearly see the University's motivation to comply with international standards, they strongly encourage those responsible to act accordingly by following the aspects mentioned above.

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

The programme coordinators emphasize in their comments on the report that all students from the programmes under review are able to use most laboratories to conduct their research. Only a few specific labs would be restricted in use as they are purely dedicated to research activities.

Concerning the discussed issues regarding the laboratory equipment and safety, it is outlined that several efforts have been made already in order to address this. Each lab has been equipped with fire extinguisher and first-aid-box. In addition, each floor has a fire extinguisher as well as first-aid-box which has been installed. The relatable figures of both improvements are presented along the UNY's comments. Furthermore, the study programmes have written and issued a safety issues policy. This policy covers the requirement of students to use self-protection equipment including lab coat, goggles, gloves (when appropriate), face mask (when appropriate), and wearing closed shoes. In addition, an emergency shower and eye shower were under construction while the comment was being prepared and should meanwhile be installed.

A warehouse to store the chemicals is actually available but not in use. The coordinators explain that the access is limited only to few people, namely the laboratory assistant and the head of the laboratory. The number of fume hoods is, unfortunately, restricted to two in each lab and more cannot be installed because of the architecture. In terms of secure disposal of chemicals waste, the programmes use several containers with cover for various specific chemical waste. The container differentiates in several types following the types of chemical waste such as solid, organic solvent, non-organic solvent, strong acid, weak acid, strong base, weak base, salt waste, etc. These kinds of waste could be processed as harmful and toxic waste by the help of other parties (third parties) as the waste management.

As for the HPLC, AAS, NMR, mass spectrometry, and gas chromatography provision, even though UNY does not have several of these instruments, they explain that they do have collaborations with other institutions such as using NMR and HPLC at Gadjah Mada University, using Mass Spectrometry at Universitas Sebelas Maret, and also SEM at LIPI. In total,

a list of the equipment needed in the laboratory with a figure on each equipment has been attached to the Universities comments.

The coordinators summarize, that other tools and equipment are required to guarantee safety and provide research opportunities for the students. Procurement of tools in the laboratory is regulated through the SOP. Study programmes or departments propose new acquisitions to the Dean. Those in charge will develop a five-year plan to provide these tools/equipment for their laboratories.

Concerning the safety instruction of the students, it is pointed out that at the beginning of laboratory work activities starting from the first semester, students receive learning material about safety standards when dealing with laboratory work.

In conclusion, the peers show themselves impressed by the many improvements that have already been initiated during the short interval after the site-visit. They understand that many of these changes require still more time and not everything will be possible to achieve due to the high costs implicated. From the provided material they consider some of their remarks already met. For the complete fulfilment of their requests they wait for the presentation of the investment plan as it has been announced by the programme coordinators. Despite the very positive development in very short time the peers underline the primary importance of safety in Chemistry as well Biology laboratories. Several aspects that were addressed in the report and element visible from the pictures handed in by UNY do not yet completely fulfil the peers' expectations. Thus, they outline that autoclaves should be available to dispose of genetically modified organisms. The fume hoods which were photographed seem partly to be made of wood, a fact, that cannot be accepted. Wood in any form in the laboratories needs to be replaced by chemical-resistant synthetic material. In addition, the peers ask the University to check if the installation of more than two fume hoods would not be possible. According to the peers it needs also be ensured that gas bottles are tied to the walls, not standing around loose and grilles in front of laboratory windows should be avoided in order to be effective escape routes. In conclusion, the peers explicitly congratulate the University to the many improvements that have already been achieved but still see the need to improve some safety standards in order to close the gap to world-class standards.

Thus, they consider the criterion to be partly fulfilled.

5. Transparency and documentation

Criterion 5.1 Module descriptions
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Evidence:

- Module Handbooks, containing module descriptions, for each of the five degree programmes
- Self-Assessment Report informs about recent changes made in respective module handbooks
- Discussions during the audit, especially with the programme coordinators allow an understanding of the creation and updating of the module descriptions

Preliminary assessment and analysis of the peers:

The module descriptions are published on UNY's website in both Bahasa Indonesia and English so that students and stakeholders can access them at any time.

After studying the module descriptions, the peers confirm that they include all necessary information about the persons responsible for each module, the teaching methods and work load, the credit points awarded, the intended learning outcomes, the applicability, the admission and examination requirements, and the forms of assessment, and details explaining how the final grade is calculated. The peers point out, that currently the module descriptions usually only recommend literature in Bahasa and not in the English original. Since the use of English language for reasons of internationalization but also in order to keep up with the most recent development in research should be further promoted the peers suggest to include English literature in their recommendations on a regular basis.

Criterion 5.2 Diploma and Diploma Supplement

Evidence:

- Sample Transcript of Records for each degree programme
- Sample Diploma certificate for each degree programme
- Sample Diploma Supplement for each degree programme

Preliminary assessment and analysis of the peers:

The peers confirm that there exist diploma supplements for all five degree programmes that entail the general information about the degree programme, the student's grade as well as detailed information about the qualification objectives and learning outcomes of the programme. The peers notice, however, that this diploma supplement does not adhere to the international standard as it, for example, does not include any information about the

applicable educational system, the procedure on which the final grade is based, or statistical data allowing the reader to categorize the individual result/degree with regard to the ECTS User's Guide.

During the discussion with the students, the peers are also informed that diploma supplements are not given automatically to the students upon their graduation but that students have to request the diploma supplement, which may take some time to be handed out. As the diploma supplement is indispensable for the students' international career, UNY must ensure that all necessary information are covered and that the diploma supplement is handed out to the students automatically immediately after graduation.

Criterion 5.3 Relevant rules

Evidence:

- Academic Regulation Yogyakarta State University
- Regulation of the Minister of Research, Technology, and Higher Education of the Republic of Indonesia Concerning Nomenclature of Study Programs in Higher Education
- Regulation of the Minister of Research, Technology, and Higher Education of the Republic of Indonesia Concerning the National Standards of Higher Education
- Regulation of the Minister of Research, Technology, and Higher Education of the Republic of Indonesia on Diploma, Certificate of Competency, Certificate of Profession, Degree and how to write Academic Degree in Higher Education Institution
- Government Rule – National Student Admission
- Government Rule – Teacher and Lecturer
- Government Rule – Career Development
- Regulations regarding Student Mobility and Guidelines on Credit Transfer

Preliminary assessment and analysis of the peers:

The peers confirm that the rights and duties of both UNY and the students are clearly defined and binding. All rules and regulations are published on the university's website and hence are available to all relevant stakeholders.

In addition, students receive all relevant course materials in the language of the degree programme at the beginning of each semester.

Final assessment of the peers after the comment of the Higher Education Institution regarding criterion 5:

From the comments on the peers' report, they understand that currently the module descriptions only recommend literature in Bahasa and not in English as the regular basis or suggested readings. However, many academic staff members have been suggesting the students to use any textbook or international journals in their learning activities. The university also provides digital library facilities and has subscribed to several international journals. The peers approve of this information but still recommend to include English literature into the module descriptions as to make their availability and relevance more visible to the students.

To address the peers' request concerning the Diploma Supplement, UNY Rectors issued a statement that starting from January 2020, each UNY graduate must be given an SKPI together with the graduate certificate/diploma. The format of the SKPI will add a section where there is information on the conversion from the Indonesian SKS system to the ECTS included. This change is much appreciated by the peers who await an exemplary version of this revised document before they entirely discharge their request.

In conclusion, they consider the criterion to be partly fulfilled.

6. Quality management: quality assessment and development

Criterion 6 Quality management: quality assessment and development

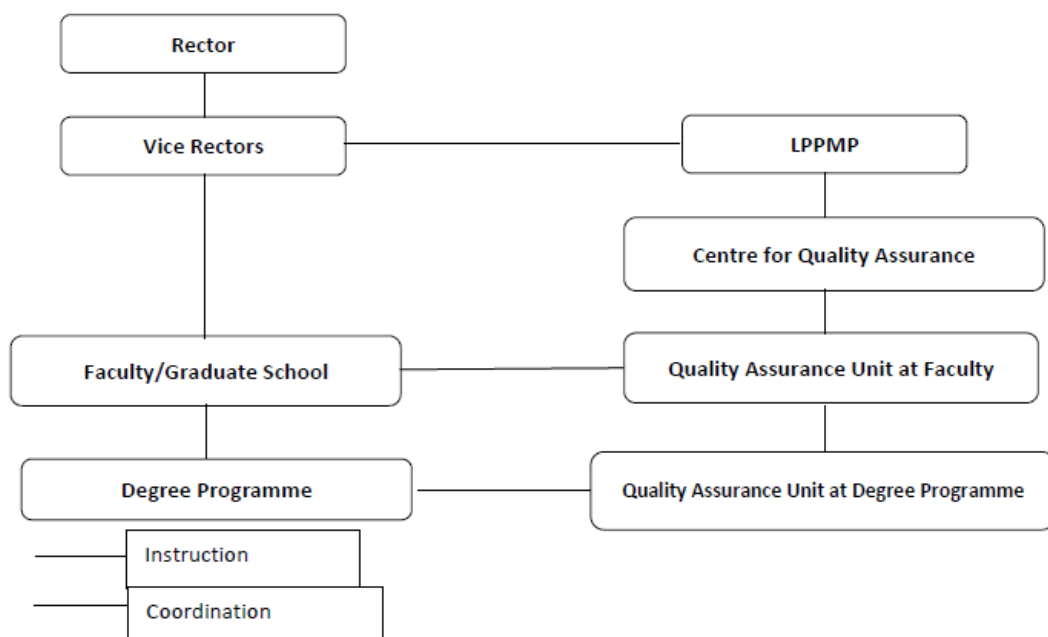
Evidence:

- The "Internal Quality Assurance System / Quality Procedures and Work Instructions" sets the structure and guidelines for the quality assurance system of UNY
- The "Quality Standards of Yogyakarta State University" details how UNY defines and controls the quality of its study programmes
- The "Curriculum Development Guidebook and Curriculum Handbook" informs about how the curricula of all five study programmes are created and continuously developed
- The "Annual Report of Yogyakarta State University" shows the current state of UNY, especially with regard to its quality assessment.
- The Self-Assessment Report details the methods UNY utilizes to control and improve

the quality of its degree programmes

Preliminary assessment and analysis of the peers:

UNY follows a clear quality assurance system in accordance with Law No. 12 of 2012 about Higher Education. This system includes an internal as well as an external quality assurance system, both systems being regulated by decrees from the Ministry of Research and Technology. Since 2015, UNY is committed to following this structured quality assurance and management process. Its implementation was coordinated by the Education Quality Assurance Development Agency through the Quality Assurance Centre. There are two units under the Center for Quality Assurance, namely one at the faculty and one at the degree programme level.



External quality assessment of the degree programmes is provided by the National Accreditation Agency for Higher Education (BAN-PT) every five years. This national standard of higher education was designed to encourage educational institutions to improve their performance in providing quality education services. Moreover, the objective of this standard is to support transparency and accountability in the implementation of the national education system.

Internal quality assessment of the degree programme is carried out through internal audits and evaluations. The internal audit is conducted every year by UNY's internal auditors. In addition, monitoring and evaluating of all courses is carried out through a survey of university service satisfaction through the online platform, which involves students, lecturers, and academic staff. The students, for example, give their feedback on each course by filling out the questionnaire online. Giving feedback on the classes is compulsory for the students;

otherwise they cannot access their grades for the course on the e-learning platform. The course evaluations are held during the final exam's week, and a compilation of the students' feedback is sent to the respective lecturer.

In addition to these measures, students state that they can always voice criticism or concern directly to their lecturers, their head of faculty, or the dean and they feel that they are taken seriously.

The peers discuss with the representatives of UNY's partners from public institutions and private companies that UNY regularly invites them to roundtables, where they discuss the needs and requirements of the employers as well as possible changes to the degree programmes. As the peers consider the input of the employers to be very important for the further improvement of the degree programmes they appreciate the existing culture of quality assurance with the involvement of all stakeholders in the quality assurance process.

During the discussion with the programme coordinators, the peers also learn that alumni are regarded as one of UNY's highest capital as they mark a link between the university and the economic world, especially since the alumni are distributed all over Indonesia or even abroad. Hence, alumni are frequently invited to UNY to talk to the current students about their career or to give support to them during their final thesis.

In summary, the peer group confirms that the quality management system is suitable to identify weaknesses and to improve the degree programmes. All stakeholders are involved in the process.

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

Along with the comments on the peers' report the UNY provides statistical data outlining the number of enrolled students in the past years, number of dropouts, study duration, and study success rates for all programmes under review.

In conclusion, the peers consider this criterion to be fulfilled.

D Additional Documents

Before preparing their final assessment, the panel asks 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:

- ~~D 1. Statistical data outlining the number of enrolled students in the past years, number of dropouts, study duration, and study success rates~~
- ~~D 2. Dates of original foundation of the respective programmes~~

E Comment of the Higher Education Institution (19.01.2020)

The institution provided a detailed statement in a separate document.

F Summary: Peer recommendations (07.02.2020)

Taking into account the additional information and the comments the peers summarize 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 Chemistry	With requirements for one year		30.09.2025
Ba Chemistry Education	With requirements for one year		30.09.2025
Ma Chemistry Education	With requirements for one year		30.09.2025
Ba Biology	With requirements for one year		30.09.2025
Ba Biology Education	With requirements for one year		30.09.2025

Requirements

For all programmes

- A 1. (ASIIN 2.2) Implement a system to continuously measure the students' workload.
- A 2. (ASIIN 3.2) The Diploma Supplement must match international standards and should be provided to the students upon graduation by default.

For the Bachelor programmes

- A 3. (ASIIN 4.3) Provide an approved investment plan outlining how the laboratory equipment will be updated as outlined in the report within the next five years.
- A 4. (ASIIN 4.3) The security standards in the laboratories need to be improved according to the aspects outlined in the report in order to comply with international standards.

For the Bachelor programmes in Biology

- A 5. (ASIIN 1.3) Aspects of Bio-Informatics need to be mandatorily included in the curriculum.

For the Bachelor of Science programmes in Biology and Chemistry

- A 6. (ASIIN 1.1) The learning outcomes must refer in more detail to the subject-specific particularities of the science paths in distinction from the Bachelors of Education.

Recommendations

For all programmes

- E 1. (ASIIN 1.3) It is recommended to teach more classes in English so that students are prepared for an international career.
- E 2. (ASIIN 3) It is recommended to reduce the number of quizzes students have to take during each semester.
- E 3. (ASIIN 5.1) It is recommended to update the literature recommendations in the module descriptions and to increase the use of English-speaking literature.
- E 4. (ASIIN 2.1) It is recommended to increase the number of international co-operations in order to improve the internationalization process.

For the Bachelor programmes in Biology

- E 5. (ASIIN 1.3) It is recommended to strengthen topics of molecular Biology and Cell-Biology in the curricula.

G Comment of the Technical Committees

Technical Committee 09 – Chemistry

Assessment and analysis for the award of the ASIIN seal:

Mr. Arnold reports on the proceedings. The six requirements proposed by the peers are of a rather technical nature and are typical for procedures in Indonesia. The Technical Committee agrees with the assessment of the peers and supports the requirements. They only suggest grammatical changes to requirement A2 (safety instead of security) and to requirement A 6 (from instead of form). With regard to recommendation 2, the TC proposes an amendment to make it clear that the problem is the amount of written quizzes or exams.

The TC 09 – Chemistry recommends the award of the seals as follows:

Degree Programme	ASIIN-seal	Subject-specific label	Maximum duration of accreditation
Ba Chemistry	With requirements for one year		30.09.2025
Ba Chemistry Education	With requirements for one year		30.09.2025
Ma Chemistry Education	With requirements for one year		30.09.2025
Ba Biology	With requirements for one year		30.09.2025
Ba Biology Education	With requirements for one year		30.09.2025

Technical Committee 10 – Life Sciences

Assessment and analysis for the award of the ASIIN seal:

Mr. Arnold reports on the proceedings. The six requirements proposed by the peers are of a rather technical nature and are typical for procedures in Indonesia. The Technical Committee agrees with the assessment of the peers and supports the requirements. They only suggest a grammatical change to requirement A2 (safety instead of security) and A6 (from instead of form).

The TC 10 – Life Sciences recommends the award of the seals as follows:

Degree Programme	ASIIN-seal	Subject-specific label	Maximum duration of accreditation
Ba Chemistry	With requirements for one year		30.09.2025
Ba Chemistry Education	With requirements for one year		30.09.2025
Ma Chemistry Education	With requirements for one year		30.09.2025
Ba Biology	With requirements for one year		30.09.2025
Ba Biology Education	With requirements for one year		30.09.2025

Requirements

For all programmes

- A 1. (ASIIN 2.2) Implement a system to continuously measure the students' workload.
- A 2. (ASIIN 3.2) The Diploma Supplement must match international standards and should be provided to the students upon graduation by default.

For the Bachelor programmes

- A 3. (ASIIN 4.3) Provide an approved investment plan outlining how the laboratory equipment will be updated as outlined in the report within the next five years.
- A 4. (ASIIN 4.3) The safety standards in the laboratories need to be improved according to the aspects outlined in the report in order to comply with international standards.

For the Bachelor programmes in Biology

- A 5. (ASIIN 1.3) Aspects of Bio-Informatics need to be mandatorily included in the curriculum.

For the Bachelor of Science programmes in Biology and Chemistry

- A 6. (ASIIN 1.1) The learning outcomes must refer in more detail to the subject-specific particularities of the science paths in distinction ~~form~~ from the Bachelors of Education.

Recommendations

For all programmes

- E 1. (ASIIN 1.3) It is recommended to teach more classes in English so that students are prepared for an international career.
- E 2. (ASIIN 3) It is recommended to reduce the number of written quizzes/exams students have to take during each semester.
- E 3. (ASIIN 5.1) It is recommended to update the literature recommendations in the module descriptions and to increase the use of English-speaking literature.
- E 4. (ASIIN 2.1) It is recommended to increase the number of international co-operations in order to improve the internationalization process.

For the Bachelor programmes in Biology

- E 5. (ASIIN 1.3) It is recommended to strengthen topics of molecular Biology and Cell-Biology in the curricula.

H Decision of the Accreditation Commission (20.03.2020)

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

The Accreditation Committee discusses the procedure and agrees with the assessment of the peers as well as the minor modifications of the Technical Committees.

The Accreditation Commission for Degree Programmes decides to award the following seals:

Degree Programme	ASIIN-seal	Subject-specific label	Maximum duration of accreditation
Ba Chemistry	With requirements for one year		30.09.2025
Ba Chemistry Education	With requirements for one year		30.09.2025
Ma Chemistry Education	With requirements for one year		30.09.2025
Ba Biology	With requirements for one year		30.09.2025
Ba Biology Education	With requirements for one year		30.09.2025

Requirements

For all programmes

- A 1. (ASIIN 2.2) Implement a system to continuously measure the students' workload.
- A 2. (ASIIN 3.2) The Diploma Supplement must match international standards and should be provided to the students upon graduation by default.

For the Bachelor programmes

- A 3. (ASIIN 4.3) Provide an approved investment plan outlining how the laboratory equipment will be updated as outlined in the report within the next five years.
- A 4. (ASIIN 4.3) The safety standards in the laboratories need to be improved according to the aspects outlined in the report in order to comply with international standards.

For the Bachelor programmes in Biology

A 5. (ASIIN 1.3) Aspects of Bio-Informatics need to be mandatorily included in the curriculum.

For the Bachelor of Science programmes in Biology and Chemistry

A 6. (ASIIN 1.1) The learning outcomes must refer in more detail to the subject-specific particularities of the science paths in distinction from the Bachelors of Education.

Recommendations

For all programmes

E 1. (ASIIN 1.3) It is recommended to teach more classes in English so that students are prepared for an international career.

E 2. (ASIIN 3) It is recommended to reduce the number of written quizzes/exams students have to take during each semester.

E 3. (ASIIN 5.1) It is recommended to update the literature recommendations in the module descriptions and to increase the use of English-speaking literature.

E 4. (ASIIN 2.1) It is recommended to increase the number of international co-operations in order to improve the internationalization process.

For the Bachelor programmes in Biology

E 5. (ASIIN 1.3) It is recommended to strengthen topics of molecular Biology and Cell-Biology in the curricula.

I Fulfilment of Requirements (16.03.2021)

Analysis of the peers and the Technical Committees (01.03.2021)

Requirements

For all degree programmes

A 1. (ASIIN 2.2) Implement a system to continuously measure the students' workload.

Initial Treatment	
Peers	fulfilled Vote: unanimous Justification: UNY has implement a workload survey, which is integrated with the survey of teaching and learning processes. UNY students must participate in the survey twice for each semester: at the beginning and at the end of the semester for each course that they attend.
TC 09	fulfilled Vote: unanimous Justification: The TC agrees with the peers' assessment.
TC 10	fulfilled Vote: unanimous Justification: The TC agrees with the peers' assessment.

A 2. (ASIIN 5.2) The Diploma Supplement must match international standards and should be provided to the students upon graduation by default.

Initial Treatment	
Peers	fulfilled Vote: unanimous Justification: UNY has designed a Diploma Supplement, which will be automatically handed out to the students along with diploma and transcript when they graduate.
TC 09	fulfilled Vote: unanimous Justification: The TC agrees with the peers' assessment.
TC 10	fulfilled

	Vote: unanimous Justification: The TC agrees with the peers' assessment.
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For the Bachelor programmes

- A 3. (ASIIN 4.3) Provide an approved investment plan outlining how the laboratory equipment will be updated as outlined in the report within the next five years.

Initial Treatment	
Peers	not fulfilled Vote: unanimous Justification: Some improvements are planned but the submitted investment plan is not sufficient. As mentioned and specified in the report, the peers expect the university to provide more and more modern laboratory equipment within the next five years.
TC 09	not fulfilled Vote: unanimous Justification: The TC agrees with the peers' assessment.
TC 10	not fulfilled Vote: unanimous Justification: The TC agrees with the peers' assessment.

- A 4. (ASIIN 4.3) The safety standards in the laboratories need to be improved according to the aspects outlined in the report in order to comply with international standards.

Initial Treatment	
Peers	not fulfilled Vote: unanimous Justification: The submitted documents show that some improvements were made but there still substantial deficits. For example, there should be more fume hoods in the chemistry laboratories, the change to non-wooden workbenches should be done quicker, eye-showers need to be in each laboratory, and goggles must be available.
TC 09	not fulfilled Vote: unanimous Justification: The TC agrees with the peers' assessment.
TC 10	not fulfilled Vote: unanimous Justification: The TC agrees with the peers' assessment.

For the Bachelor programmes in Biology

A 5. (ASIIN 1.3) Aspects of Bio-Informatics need to be mandatorily included in the curriculum.

Initial Treatment	
Peers	fulfilled Vote: unanimous Justification: A course in Bio-Informatics will be presented as a new course in the next semester.
TC 09	fulfilled Vote: unanimous Justification: The TC agrees with the peers' assessment.
TC 10	fulfilled Vote: unanimous Justification: The TC agrees with the peers' assessment.

For the Bachelor of Science programmes in Biology and Chemistry

A 6. (ASIIN 1.1) The learning outcomes must refer in more detail to the subject-specific particularities of the science paths in distinction from the Bachelors of Education.

Initial Treatment	
Peers	fulfilled Vote: unanimous Justification: The intended learning outcomes have be re-formulated and the distinction between the scientific and the educational paths is now clearer.
TC 09	fulfilled Vote: unanimous Justification: The TC agrees with the peers' assessment.
TC 10	fulfilled Vote: unanimous Justification: The TC agrees with the peers' assessment.

Decision of the Accreditation Commission (16.03.2021)

Degree Programme	ASIIN seal	Subject-specific labels	Maximum duration of accreditation
Ba Chemistry	Requirements 3, 4 not fulfilled	-	Six months prolongation
Ba Chemistry Education	Requirements 3, 4 not fulfilled	-	Six months prolongation
Ma Chemistry Education	All requirements fulfilled		30.09.2025
Ba Biology	Requirements 3, 4 not fulfilled		Six months prolongation
Ba Biology Education	Requirements 3, 4 not fulfilled		Six months prolongation

J Fulfilment of Requirements (17.09.2021)

Analysis of the peers and the Technical Committees (02.09.2021)

Requirements

For the Bachelor programmes

- A 3. (ASIIN 4.3) Provide an approved investment plan outlining how the laboratory equipment will be updated as outlined in the report within the next five years.

Initial Treatment	
Peers	not fulfilled Vote: unanimous Justification: Some improvements are planned but the submitted investment plan is not sufficient. As mentioned and specified in the report, the peers expect the university to provide more and more modern laboratory equipment within the next five years.
TC 09	not fulfilled Vote: unanimous Justification: The TC agrees with the peers' assessment.
TC 10	not fulfilled Vote: unanimous Justification: The TC agrees with the peers' assessment.
AK	not fulfilled Vote: unanimous Justification: Some improvements are planned but the submitted investment plan is not sufficient. As mentioned and specified in the report, the peers expect the university to provide more and more modern laboratory equipment within the next five years.
Secondary Treatment	
Peers	fulfilled Vote: unanimous Justification: The peers support the submitted investment plan. Even with the financial restrictions, UNY really wants to build up modern infrastructure in terms of safety and research.
TC 09	fulfilled Vote: unanimous Justification: The TC follows the peers' judgement.
TC 10	fulfilled

	<p>Vote: unanimous Justification: The TC follows the peers' judgement.</p>
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- A 4. (ASIIN 4.3) The safety standards in the laboratories need to be improved according to the aspects outlined in the report in order to comply with international standards.

Initial Treatment	
Peers	<p>not fulfilled Vote: unanimous Justification: The submitted documents show that some improvements were made but there still substantial deficits. For example, there should be more fume hoods in the chemistry laboratories, the change to non-wooden workbenches should be done quicker, eye-showers need to be in each laboratory, and goggles must be available.</p>
TC 09	<p>not fulfilled Vote: unanimous Justification: The TC agrees with the peers' assessment.</p>
TC 10	<p>not fulfilled Vote: unanimous Justification: The TC agrees with the peers' assessment.</p>
AK	<p>not fulfilled Vote: unanimous Justification: The submitted documents show that some improvements were made but there still substantial deficits. For example, there should be more fume hoods in the chemistry laboratories, the change to non-wooden workbenches should be done quicker, eye-showers need to be in each laboratory, and goggles must be available</p>
Secondary Treatment	
Peers	<p>fulfilled Vote: unanimous Justification: The peers consider the now undertaken additional improvement with respect to the safety standards in the laboratories to be sufficient. However, UNY should take into account that the safety installations need to be regularly revised and that all emergency showers must be installed inside the laboratories and not outside.</p>
TC 09	<p>fulfilled Vote: unanimous Justification: The TC follows the peers' judgement. However, they propose to include a note in the decision letter to the university.</p>
TC 10	<p>fulfilled Vote: unanimous Justification: The TC follows the peers' judgement.</p>

Decision of the Accreditation Commission (17.09.2021)

Degree Programme	ASIIN seal	Subject-specific labels	Maximum duration of accreditation
Ba Chemistry	All requirements fulfilled*	-	30.09.2025
Ba Chemistry Education	All requirements fulfilled*	-	30.09.2025
Ba Biology	All requirements fulfilled*		30.09.2025
Ba Biology Education	All requirements fulfilled*		30.09.2025

*Note in the decision letter to the university:

„UNY should take into account that the safety installations need to be regularly revised and that all emergency showers must be installed inside the laboratories and not outside”

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 degree programme Education in Biology:

Table 1.1 Graduate Profiles Description

Graduates Profiles	Description
Prospective biology educator (High School)	Having the competencies to be omid-term examinationtanding, creative, and innovative prospective High School Biology teachers/educators who uphold the pious, independent, and intellectual values
Research assistant in biology education	Being able to conduct research that contribute to solving the problems in the biology education, especially through the development of local wisdom-based learning resources
Entrepreneur in the field of biology education	Possessing entrepreneurial insight and competency whether independently or with others in the field of biology education that are able to contribute to the surrounding community in an accountable, credible, and transparent manner

Based on the Program Outcome and other sources above, BEB develops Program Learning Outcome (PLO). BEB Program Outcomes are elaborated in the Program Learning Outcomes, as follows.

Table 1.2 Bachelor of Education in Biology Program Learning Outcomes

PLO 1	Being pious to God Almighty and upholding humanity values in conducting the duties.
PLO 2	Having the attitudes with society, nation, and state values with the foundation of Pancasila.
PLO 3	Demonstrating responsibility, independence, entrepreneurship, and adaptation in conducting the duties.
PLO 4	Mastering basic biology and other relevant knowledge with mathematics and natural sciences.
PLO 5	Understanding the principles of TPACK (<i>Technological Pedagogical and Content Knowledge</i>) in biology learning.
PLO 6	Mastering the use of information and communication technology in biology learning.
PLO 7	Being able to do independent laboratory work and fieldwork.
PLO 8	Being able to plan, implement, assess, and follow up the educational biology learning.
PLO 9	Mastering the research methods in biology education as well as its applications.
PLO 10	Being able to communicate and collaborate well both verbally and non-verbally.
PLO 11	Possessing managerial skill of the profession.
PLO 12	Improving the professional expertise through training, work experience or sustainable education.

The following **curriculum** is presented:

Table 1.9 Common Ground of BEB

No	Course	Credits	ECTS	Semester	
				Odd	Even
1	Basic Biology	3	4.92	√	
2	General Chemistry	3	4.92	√	
3	General Physics	3	4.92		√
4	Basic Mathematics	2	3.28	√	
5	Biochemistry	3	4.92		√

Appendix: Programme Learning Outcomes and Curricula

6	Cell and Molecular Biology	3	4.92		√
7	Ecology	3	4.92	√	
8	Environmental Science	3	4.92		√
9	Marine Biology	3	4.92	√	
10	Genetics	3	4.92		√
11	Evolution	3	4.92	√	
12	Organism Behavior	2	3.28	√	
13	Biometry	3	4.92		√
14	Biotechnology	3	4.92	√	
15	English for Biology	2	3.28		√
16	Total	42			

b. Study Program Specific Courses (Compulsory)

Table 1.10 Study Program Specific Courses (Compulsory)

No	Course	Credits	ECTS	Semester	
				Odd	Even
The Field of Bachelor of Education in Biology					
1	Biology Learning and Curriculum	2	3.28	√	
2	Biology Learning Strategies	3	4.92		√
3	Lab. Work in Biology Learning Media and Information Technology	2	3.28		√
4	Biology Learning Assessment	3	4.92	√	
6	Laboratory Management	2	3.28		√
7	Biology Education	2	3.28	√	
8	Biology Education Research Methodology	3	4.92		√
9	Lab. Work in Laboratory	1	1.64		√
10	Biology Research Methodology	3	4.92	√	
12	Biology Education Seminar	2	3.28		√
13	Microteaching	2	3.28		√
14	Thesis Final Assignment (TAS)	6	9.84		√
15	School Field Experience I (PLP I)	1	1.64	√	
16	School Field Experience II (PLP II)	3	4.92		√
17	Excursion Studies	1	1.64	√	
18	English for Biology Education	2	3.28		√
	TOTAL	38			
THE FIELD OF BIOLOGY					
19	Plant Diversity	3	4.92		√
21	Animal Diversity	3	4.92	√	
23	Plant Function Structure	4	6.56		√
25	Animal Function Structure	4	6.56	√	
27	Reproduction and Embryology	4	6.56	√	
29	Microbe Diversity	3	4.92		√
31	Human Biology	4	6.56	√	
33	Microtechnique	2	3.28		√
	Total	27			

According to the self-assessment report the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the Bachelor degree programme Bi-
ology:

Table 1.2. BSB Learning Outcomes

PLO 1	Upholding the values of religiosity and humanity and caring for the environment
PLO 2	Having nationalism and responsibility for the country by contributing to the improvement of the quality of society life in the Pancasila civilization
PLO 3	Obeying the law and being discipline in community and state life, by internalizing academic values, norms, and ethics
PLO 4	Comprehensively mastering Biology (core biology) to solve problems in the field of Biology (problem-solving) and to underlie the concepts of related sciences
PLO 5	Mastering the techniques and methodologies in Biology as well as familiar with the equipment used in Biology laboratories in order to get the knowledge of Biology (how we know what we know)
PLO 6	Being adaptive, creative, innovative in applying the concepts of Biology and other related fields
PLO 7	Being skillful in applying the techniques used in laboratories and daily life
PLO 8	Being skillful in utilizing local potentials according to the special interests of Biology studies
PLO 9	Being able to work and create jobs/being an entrepreneur in the field of Biology
PLO 10	Having managerial ability to supervise and evaluate workers and optimizing the networks in order to develop professionalism
PLO 11	Possessing scientific skills to support the ability to speak in local, national, and international forums

The following **curriculum** is presented:

1. Distribution of Subjects per Semester

SEMESTER I

No	Code	Courses	Details of Credits			
			T	P	L	J
1	MKU6301	Islamic Education	3			3
	MKU6302	Catholic Education	3			3
	MKU6303	Christian education	3			3
	MKU6304	Buddhist education	3			3
	MKU6305	Hindu education	3			3
	MKU6306	Confucian Education	3			3
2	BIO6201	Basic Biology	2			2
3	BIO6102	Basic Biology Practicum		1		1
4	BIO6203	General Chemistry	2			2
5	BIO6104	General Chemistry Practicum		1		1
6	BIO6207	Basic Mathematics	2			2
7	BIM6201	Plant Anatomy	2			2
8	BIM6102	Plant Anatomy Practicum		1		1
9	BIM6203	Plant Morphology	2			2
10	BIM6104	Plant Morphology Practicum		1		1

Appendix: Programme Learning Outcomes and Curricula

11	BIM6207	Invertebrate Biology	2			2
12	BIM6108	Invertebrate Biology Practicum*)		1		1
Total			15	5	-	20

SEMESTER II

No	Code	Course	Details of Credits			
			T	P	L	J
1	MKU6214	Socio Cultural Education	2			2
2	MKU6208	Pancasila	2			2
3	MKU6210	Statistics	2			2
4	BIO6205	General Physics	2			2
5	BIO6106	General Physics Practicum		1		1
6	BIO6208	Biochemistry	2			2
7	BIO6109	Biochemistry Practicum		1		1
8	BIM6209	Vertebrate Biology	2			2
9	BIM6110	Vertebrate Biology Practicum*)		1		1
10	BIM6205	Animal Anatomy and Histology	2			2
11	BIM6106	Animal Anatomy and Histology Practicum		1		1
12	BIM6211	Plant Systematics	2			2
13	BIM6112	Plant Systematics Practicum		1		1
Total			16	5		21

SEMESTER III

No	Code	Course	Details of Credits			
			T	P	L	J
1	MKU6207	Civic education	2			2
2	BIO6210	Molecular Cell Biology	2			2
3	BIO6111	Molecular Cell Biology Practicum		1		1
4	BIO6214	Ecology	2			2
5	BIO6115	Ecology Practicum *)		1		1
6	BIO6227	Biometry	2			2
7	BIO6128	Biometry Practicum		1		1
8	BIM6217	Animal physiology	2			2
9	BIM6118	Animal physiology Practicum		1		1
10	BIM6213	Microbiology	2			2
11	BIM6114	Microbiology Practicum		1		1
12	BIM6219	Plant Development Biology	2			2
13	BIM6120	Plant Development Practicum		1		1
14	BIO6220	Genetics	2			2
15	BIO6121	Genetics Practicum		1		1
Total			14	6		23

SEMESTER IV

No	Code	Course	Details of Credits			
			T	P	L	J
1	AMF6201	Concept and Studies on Mathematics and Natural Sciences	2			2
2	MKU6211	English Language	2			2
3	MKU6212	Entrepreneurship	2			2
4	BIO6212	Mycology	2			2
5	BIO6113	Mycology Practicum		1		1
6	BIO6216	Environmental Science	2			2
7	BIO6117	Environmental Science Practicum*)		1		1
8	BIM6215	Plant Physiology	2			2
9	BIM6116	Plant Physiology Practicum		1		1
10	BIM6221	Animal Development Biology	2			2
11	BIM6122	Animal Development Biology Practicum		1		1
12	BIM6230	Bivariate Biological Research Methodology	2			2
13	BIM6131	Bivariate Biological Research Methodology Practicum		1		1
14	BIO6237	English for Biology-1	2			2
Total			16	5		23

SEMESTER V

No	Code	Course	Details of Credits			
			T	P	L	J
1	MKU6209	Indonesian Language	2			2
2	BIM6232	Multivariate Biological Research Methodology	2			2
3	BIM6133	Multivariate Biological Research Methodology Practicum		1		1
4	BIM6226	Ecotoxicology	2			2
5	BIM6127	Ecotoxicology Practicum		1		1
6	BIM6228	Soil Biology	2			2
7	BIM6129	Soil Biology Practicum		1		1
8	BIM6124	Microtechnique	1			1
9	BIM6225	Microtechnique Technique		2		2
10	BIM6136	Excursion Study 1		1		1
11		<i>Elective Course</i>				8
Total			11	7		23

SEMESTER VI

No	Code	Course	Details of Credits			
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Appendix: Programme Learning Outcomes and Curricula

			T	P	L	J
1	BIO6225	Plant Tissue Culture	1			1
2	BIO6126	Plant Tissue Culture Practicum		2		2
3	BIO6222	Evolution	2			2
4	BIO6123	Evolution Practicum*)		1		1
5	BIO6224	Organism Behavior	2			2
6	BIO6218	Marine Biology	2			2
7	BIO6119	Marine Biology Practicum*)		1		1
8	BIM6223	Biotechnology	2			2
9	BIM6138	Biotechnology Practicum		1		1
10	BIM6137	Excursion Study 2		1		1
11		<i>Elective Course</i>				4
12	BIM6235	Seminar and Scientific Paper Writing		2		2
13	BIM6234	Philosophy of Science	2			2
Total			11	6		23

SEMESTER VII

No	Code	Course	Details of Credits			
			T	P	L	J
1	MKU6313	Community Service			3	3
4	PKL6302	Field Practice			3	3
Total			2	2	6	6

SEMESTER VIII

No	Code	Course	Details of Credits			
			T	P	L	J
1	BIO6629	Thesis Project		6		6
Total						6

According to the self-assessment report the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the Bachelor degree programme Education in Chemistry:

Table 1.1 Program Learning Outcomes

Domain	BEC Learning Outcomes
Attitude	1. The graduates of Bachelor of Education in Chemistry demonstrate religious spirit, moral, ethics, and characters of Indonesia in a community, society, and state life
	2. The graduates of Bachelor of Education in Chemistry demonstrate independence both individual and group work
Knowledge	3. The graduates of Bachelor of Education in Chemistry apply the concepts, principles, laws, and theories of chemistry, education, and chemistry education that are continuously updated as a part of lifelong learning
Specific Skill	4. The graduates of Bachelor of Education in Chemistry adapt scientific work skills and chemical learning skills that are continuously updated as a part of lifelong learning to solve problems related to chemistry and chemistry education
Generic Skill	5. The graduates of Bachelor of Education in Chemistry adapt the ability for critical and creative thinking in dealing with problems in their careers or personal lives
	6. The graduates of Bachelor of Education in Chemistry implement cooperative skills in conducting their duties and solving problems

The following **curriculum** is presented:

Courses Distribution in Every Semester

Sem.	Code	Course	SKS				ECTS
			T	P	L	J	
1	MKU 6301	Islam Education*	3			3	
	MKU 6302	Catholic Education*	3			3	
	MKU 6303	Christian Education*	3			3	
	MKU 6304	Buddhism Education*	3			3	
	MKU 6305	Hindunism Educaation*	3			3	
	MKU 6306	Confucianism Education*	3			3	
	MKU 6207	Civic Educaation	2			2	
	MDK 6201	Science of Education	2			2	
	MKU 6214	Social and Cultural Education	2			2	
	KIM 6401	Basic Chemistry	3	1		4	
	KIM 6302	Physics for Chemistry	2	1		3	
	KIM 6303	Biology for Chemistry	2	1		3	
	Total			16	3		19
2	MKU 6208	Pancasila	2			2	
	MKU 6210	Statistics	2			2	
	MDK 6203	Management of Education	2			2	
	MDK 6211	English Language	2			2	
	AMF 6201	Insight and Analysis of Natural Science	2			2	
	KIM 6304	Mathematics for Chemistry	3			3	
	KIM 6411	Basic of Analytical Chemistry	3	1		4	
	KIM 6409	Nonmetal Inorganic Chemistry	3	1		4	
Total			19	2		21	34.50
3	MDK 6202	Psychology of Education	2			2	
	MDK 6204	Sociology and Anthropology of Education	2			2	
	MPK 6201	Review of Chemical Curriruculum	2			2	
	MPK 6202	Chemistry learning media	2			2	

Appendix: Programme Learning Outcomes and Curricula

Sem.	Code	Course	SKS				ECTS
			T	P	L	J	
	KIM 6412	Chemical separation method	3	1		4	
	KIM 6405	Chemical equilibrium	3	1		4	
	KIM 6407	Basic of organic chemistry	3	1		4	
	Total		17	3		20	32.86
4	MPK 6303	Instructional strategies of chemistry	2		1	3	
	MPK 6204	ICT application for chemistry teaching and learning	2			2	
	MKU 6212	Entrepreneurship	2			2	
	KIP 6303	Instrument Analysis Chemistry	2	1		3	
	KIM 6406	Molecular dynamics	3	1		4	
	KIM 6310	Inorganic metal chemistry	2	1		3	
	KIM 6408	Reactivity and mechanism of organic reaction	3	1		4	
	Total		16	4	1	21	34.50
5	MPK 6305	Chemistry learning assessment	3			3	
	MPK 6306	Program development of chemistry learning	2		1	3	
	MKU 6209	Bahasa Indonesia	2			2	
	KIP 6205	Laboratory management	2			2	
	KIM 6215	Environmental chemistry	2			2	
	KIP 6201	Introduction to Quantum Chemistry	2			2	
	KIP 6402	Coordination chemistry and organometallic	3	1		4	
		<i>Elective Course 1</i>	2			2	
	Total		18	1	1	20	32.86
6	MPK 6307	High school chemistry	3			3	
	MPK 6208	Chemistry for vocational high school	2			2	
	MPK 6209	Micro-teaching		2		2	
	MPK 6310	Research methodology for chemistry education	3			3	
	KIP 6204	Analysis on organic compound structures	2			2	
	KIM 6413	Biochemistry	3	1		4	
		<i>Elective Course 2</i>	2			2	
		<i>Elective Course 3</i>	2			2	

Sem.	Code	Course	SKS				ECTS
			T	P	L	J	
Total			17	3		20	32.86
7	PPL 6301	Educational internship			3	3	
	MKU 6313	Community service program (KKN)			3	3	
	MPK 6211	Trend of chemistry research and learning	2			2	
	KIM 6214	Nuclear chemistry	2			2	
	KIP 6206	Industrial chemistry	2			2	
	KIP 6209	Chemistry research project		2		2	
		<i>Elective Course 4</i>	2			2	
		<i>Elective Course 5</i>	2			2	
Total			10	2	6	18	29.57
8	SPK 6601	Tugas Akhir Skripsi			6	6	
Total						6	9.85

According to the self-assessment report the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the Bachelor degree programme Chemistry:

Domain	PLO Formulation
Attitude	1. Having a religious attitude and human values
Generic Skills	2. Having an independent attitude, being able to adapt and take responsibility in completing tasks
	3. Communicating ideas orally or in written text
Knowledge	4. Applying ICT effectively in the scientific field
	5. Using various chemical research strategies and techniques to solve chemical problems and researches
	6. Being able to follow the development of science and technology as a supporter of lifelong learning process
	7. Analysing the chemical concepts and mind-set oriented to life skills
Specific Skills	8. Applying chemical science to support productive and innovative behaviour to overcome problems in society
	9. Integrating mathematical and scientific concepts to solve problems in chemistry
	10. Having the ability to innovate in chemical research techniques

Appendix: Programme Learning Outcomes and Curricula

The following **curriculum** is presented:

Semester	Course Code	Course Name	SKS	ECTS
I	MKU 6301	Islam Education	3	
	MKU 6302	Catholic Education		
	MKU 6303	Christian Education		
	MKU 6304	Buddhist Education		
	MKU 6305	Hinduism Education		

Appendix: Programme Learning Outcomes and Curricula

	MKU 6306	Confucianism Education		
	MKU 6207	Civic Education	2	
	KIM 6401	General Chemistry	4	
	KIM 6302	Physics for Chemistry	3	
	KIM 6303	Biology for Chemistry	3	
	KIM 6304	Mathematics for Chemistry	3	
	MKU 6210	Statistics	2	
Total Workload for the 1st Semester			20	33
II	MKU 6208	Pancasila	2	
	MKU 6214	Socio-cultural Education	2	
	KIM 6405	Chemical equilibrium	4	
	KIM 6407	Fundamentals of Organic Chemistry	4	
	KIM 6409	Inorganic Non-Metallic Chemistry	4	
	KMA 6215	Introduction to Computer Sciences	2	
	MKU 6212	Entrepreneurship	2	
Total Workload for the 2nd Semester			20	33
III	MKU 6211	English	2	
	KIM 6406	Molecular Dynamics	4	
	KIM 6408	Reactivity and Mechanism of Organic Reaction	4	
	KIM 6310	Inorganic Metal Chemistry	3	
	KIM 6411	Fundamentals of Analytical Chemistry	4	
	KIM 6215	Environmental Chemistry	2	
	KMA 6212	Chemical Laboratory Management	2	
Total Workload for the 3rd Semester			21	34
IV		Mathematics and Natural Sciences Insights and Studies	2	
	AMF 6201			
	KIM 6412	Chemical Separation Method	4	
	KIM 6413	Biochemistry	4	
	KMA 6205	Physical Organic Chemistry	2	
	KMA 6408	Coordination Chemistry	4	
	KMA 6317	Chemical Process Industry	3	
Total Workload for the 4th Semester			19	31
V	MKU 6209	Bahasa Indonesia	2	
	KIM 6204	Polymer Chemistry	2	
	KMA 6306	Structural Analysis of Organic Chemical Compounds	3	
	KMA 6201	Quantum Chemistry	2	
	KMA 6511	Instrumental Chemistry	5	
	KMA 6214	Physical Biochemistry	2	
	KIM 6216	Pharmaceutical chemistry	2	
	KMA 6218	Selected Topics on Chemical Research	2	
Total Workload for the 5th Semester			20	33
VI	KIM 6214	Nuclear Chemistry	2	
	KMA 6216	Computational Chemistry	2	
	KMA 6203	Surface Chemistry and Colloids	2	
	KMA 6210	Crystallochemistry	2	

Appendix: Programme Learning Outcomes and Curricula

	KMA 6213	Separation and Analysis of Chemical Compounds Method	2	
	KMA 6219	Industrial Management	2	
	KMA 6320	Research Methodology in Chemistry.	3	
		Elective course 1	2	
		Elective course 2	2	
		Elective course 3	2	
Total Workload for the 6th Semester			21	34
VII	KMA 6202	Atomic and Molecular Spectroscopy	2	
	KMA 6207	Natural Products Chemistry	2	
	KMA 6209	Chemical Application of Group Theory	2	
	PKL6302	Fieldwork practice	3	
		Elective course 4	2	
		Elective course 5	2	
		Elective course 6	2	
	MKU 6313	Community Service	3	
Total Workload for the 7th Semester			18	30
VII	KMA 6621	Thesis	6	
Total Workload for the 8th Semester			6	10
Total SKS			145	238

According to the self-assessment report the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the Master degree programme Education in Chemistry:

- PO1. Demonstrate the professional practice skills (pedagogic, personal, social and professional competencies) needed to be successful in their professional practice;
- PO2. Demonstrate the ability to master the theory, principles and practice of general chemistry;
- PO3. Understand the field of chemistry education in terms of terminology from theory and practice, research, curriculum design and teaching-learning;
- PO4. Conduct research, develop and practice in chemistry teaching techniques and methods, so that learning chemistry might be easy and fun;
- PO5. Analyze education management policies, curricula, evaluation and teaching technologies related to chemistry learning;
- PO6. Apply the knowledge gained from research and discovery in the learning process for instructional development and curriculum;
- PO7. Demonstrate the leadership roles in general chemistry education, including specifically leadership in teaching, research, curriculum and instruction.

The following **curriculum** is presented:

Table 5.1. The Curriculum of MCE and Course Description

Sem.	Course Code	Course Name ⁽¹⁾	Sem. credit unit (SKS)	SKS courses in the curriculum		Completeness ⁽³⁾			Unit/ Dep/ Organizing Faculty
				Intj ⁽²⁾	Institutional	Description	Syllabus	SAP	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
I	PAS8201	Science phylosophy	2		√	√	√	√	University
	PAS8202	Educational Research Methods	2			√	√	√	Graduate School
	PAS8203	Statistics	2		√	√	√	√	Graduate School
	KIM8201	Chemistry Learning Innovation	2	√		√	√	√	Study Programme
	KIM8204	Latest Research Study on Chemistry Education	2	√		√	√	√	Study Programme
	KIM8206	Chemical Spectroscopy	2	√		√	√	√	Study Programme
	KIM8207	Inorganic Structural Chemistry	2	√		√	√	√	Study Programme
	KIM8214	Biomolecules and Genetic Engineering	2	√		√	√	√	Study Programme
	KIM8216	Practical and Chemical Projects	2	√		√	√	√	Study Programme
II	KIM8110	Project for Writing Thesis Proposals	1	√		√	√	√	Study Programme
	KIM8202	Design and Implementation of Chemistry Curriculum	2	√		√	√	√	Study Programme
	KIM8203	Development of Chemical Learning Assessment and Eval.	2	√		√	√	√	Study Programme
	KIM8208	Elucidation of the Structure of Organic Compounds	2	√		√	√	√	Study Programme
	KIM8209	Solution Chemistry and Analytical Electrochemistry	2	√		√	√	√	Study Programme
		ELECTIVE courses	2/4	√					Study Programme
III	KIM8211	Thesis Proposal Seminar	2	√		√	√	√	Study Programme
	KIM8113	Writing Scientific Work	2	√		√	√	√	Study Programme
		ELECTIVE courses	4/2	√					Study Programme
IV	KIM8612	Thesis	6	√		√	√	√	Study Programme
Total SKS			42	36	6				