



ASIIN Seal

Accreditation Report

Bachelor's Degree Programmes

Biology Education

Biology

Chemistry Education

Chemistry

Science Education

Provided by

Universitas Negeri Malang

Version: 24.03.2023

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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	Previous accreditation (issuing agency, validity)	Involved Technical Committees (TC) ¹
S1 Pendidikan Biologi	Bachelor of Biology Education	ASIIN		10
S1 Biologi	Bachelor of Biology	ASIIN		10
S1 Pendidikan Kimia	Bachelor of Chemistry Education	ASIIN		09
S1 Kimia	Bachelor of Chemistry	ASIIN		09
S1 Pendidikan IPA	Bachelor of Science Education	ASIIN		09, 10
Date of the contract: 23.12.2020 Submission of the final version of the self-assessment report: 20.08.2021 Date of the onsite visit: 09.-11.11.2021				
Peer panel: Prof. Astrid Kaiser, University of Oldenburg Dr. Alois Palmeshofer, University of Würzburg Dr. Karsten Swarat, BCS-AIS Radolfzell Prof. José A.C. Broekaert, University of Hamburg				

¹ TC 09 - Chemistry; TC 10 - Life Sciences.

A About the Accreditation Process

Atika Rahasta, student representative (Osaka University)	
Representative of the ASIIN headquarter: Tanja Kreetz	
Responsible decision-making committee: Accreditation Commission	
Criteria used: European Standards and Guidelines as of May 15, 2015 ASIIN General Criteria, as of December 10, 2015 Subject-Specific Criteria of Technical Committee 09 – Chemistry, Pharmacy as of March 29, 2019 Subject-Specific Criteria of Technical Committee 10 – Life Sciences as of June 28, 2019	

B Characteristics of the Degree Programmes

a) Name	Final degree (original/English translation)	b) Areas of Specialization	c) Corresponding level of the EQF ²	d) Mode of Study	e) Double/Joint Degree	f) Duration	g) Credit points/unit	h) Intake rhythm & First time of offer
Biology Education	Sarjana Pendidikan (S.Pd)/ Bachelor of education	Biology teaching and instruments, Biology education research, biology	6	Full time	No	8 semesters	146 CPs (≈221 ECTS)	Annually (August) & August 1954
Biology	Sarjana Sains (S.Si)/ Bachelor of science	Biology	6	Full time	No	8 semesters	146 CPs (≈222 ECTS)	Annually (August) & August 1997
Chemistry Education	Sarjana Pendidikan (S.Pd)/ Bachelor of education	Chemistry teaching and instruments; Chemistry education research; Chemistry	6	Full time	No	8 semesters	146 CPs (≈222 ECTS)	Annually (August) & August 1964
Chemistry	Sarjana Sains (S.Si)/ Bachelor of science	1. Analytical Chemistry 2. Organic Chemistry 3. Inorganic Chemistry 4. Physical Chemistry 5. Biochemistry	6	Full time	No	8 semesters	146 CPs (≈221 ECTS)	Annually (August) & August 1997
Science Education	Sarjana Pendidikan (S.Pd)/ Bachelor of education	Science teaching and instruments, Science education research	6	Full time	No	8 semesters	146 CPs (≈221 ECTS)	Annually (August) & August 2012

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

Graduates of the degree programme Biology Education are expected to become Pancasila-spirited individuals who value aspirations and awareness based on the honing-compassion-fostering principle, have the capabilities of applying their biology and biology education

² EQF = The European Qualifications Framework for lifelong learning

mastery in managing SMA/SMK/MA (senior high school) instructions in the digital era, have the abilities to manage school laboratories, have the abilities to creatively and innovatively solve problems in biology education through research and practical actions, hence producing national-level works, have entrepreneurship capabilities, and become life-long learners. With such a profile, BBIO-EDU graduates are expected to serve as professional secondary school biology teachers.

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

BBIO graduates are expected to have the abilities to design, implement, and evaluate biology studies/research related to food, health, and environment critically, have applicative problem-solving capabilities and develop them innovatively according to the opportunities and challenges posed by current technological developments, and have entrepreneurship capabilities based on Pancasila values. With such a profile, BBIO graduates are expected to become novice biology researchers, industry practitioners, and entrepreneurs in biology.

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

BCHEM-EDU graduates are expected to be intelligent, religious, with virtuous character, independent, and capable of professional development, produce excellent scientific and creative works in the chemistry and chemistry education fields, and produce and apply community service works in the chemistry and chemistry education fields to realize an independent, productive, prosperous society. With such a profile, BCHEM-EDU graduates are expected to become professional secondary school chemistry teachers.

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

BCHEM graduates are expected to have the knowledge, attitude, and skills in chemistry in reference to the mastery of theories, laws, principles, concepts, and essential phenomena in the science of chemistry and its branches, plan and perform laboratory works in basic scientific fields, use the science of chemistry to solve problems in nature and the environment both qualitatively and quantitatively, develop themselves and improve their knowledge according to the developments in the science of chemistry, represent and offer argumentation over issues in the science of chemistry, have a sufficient scientific foundation to continue studies to the Master's level, be able to keep abreast with current development and actualize their knowledge and skills according to the developments in scientific vision ("life-long learning"), and have the right attitude and behavior in creating works, in doing works, and in societal life while paying attention to and applying professional and

B Characteristics of the Degree Programmes

cultural ethics. BCHEM graduates are expected to become researchers and industry developers, research assistants at research institutes, chemical analysts, and quality control supervisors with such a profile.

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

BSCI-EDU graduates are expected to become progressive, independent, religious, innovative, and capable graduates in adapting to the changes in curriculum, science, and information technology in junior high school science education, educational researchers, laboratory administrators, and edutainment entrepreneurs. With such a profile, BSCI-EDU graduates are expected to be professional junior high school science teachers.

C Peer Report for the ASIIN Seal³

1. The Degree Programme: Concept, content & implementation

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

Evidence:

- Self-assessment report
- Study plans and guidelines of the degree programmes
- Module descriptions
- Website
- Discussions during the online audit

Preliminary assessment and analysis of the peers:

The auditors base their assessment on the learning outcomes as detailed in the Self-Assessment Report of the five Bachelor's degree programmes under review. They refer to the Subject-Specific Criteria (SSC) of the Technical Committee 09 – Chemistry and the Technical Committee 10 – Life Sciences as a basis for judging whether the intended learning outcomes of the Bachelor's degree programme as defined by Universitas Negeri Malang correspond with the competences as outlined by the SSC.

The auditors acknowledge that the objectives, learning outcomes and graduate profiles of the Bachelor programmes are described and defined for each of the Bachelor programmes under review. For each of the five programmes, the Faculty of Mathematics and Science has published the vision, mission and objectives on its website, which are easily accessible for students and stakeholders both in Indonesian and in English; for the Bachelor's degree programme Science Education impressively altogether in eleven languages.

Graduates learning outcomes of the Bachelor's degree programme Biology focus on employing students to design, implement, and evaluate biology studies and conduct biology research related to food, health, and environment. Graduates of the degree programme

³ 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.

are also expected to have gained problem-solving capabilities as well as the ability to develop them innovatively according to the challenges posed by technological developments. Furthermore, they are expected to have acquired entrepreneurship capabilities. During the audit the peers are informed that graduates can become novice biology researchers, industry practitioners or entrepreneurs in biology.

From the documents presented and discussed during the audit, the reviewers understand that graduates of the Biology Education programme are supposed to be capable to apply biology and biology education methods, to manage digital biology learning scenarios, to organise school laboratories, to creatively and innovatively solve Biology education problems through research and practical actions, to produce work complying with the national standards and to demonstrate entrepreneurial abilities.

Graduates from the Bachelor's degree programme Chemistry Education are expected to develop research-based Chemistry education, to organise learning processes according to the latest science and technology developments by applying innovative learning models, ICT-based chemistry learning media and the latest learning technology. Graduates are furthermore expected to create assessments to contribute to students to become professional, competitive, and adaptive chemistry education graduates.

From the documents presented and the discussion during the audit, the reviewers understand that graduates of the Chemistry Education programme are expected to be able to organise research-based Chemistry education and learning processes according to the latest scientific developments by applying innovative learning models, ICT-based chemistry learning media and the latest learning technology. They are expected to develop chemistry learning assessments in order to contribute to graduates being professional, competitive, and adaptive.

Graduates of the degree programme Chemistry are expected to be able to explore, isolate, synthesise, analyse and characterise living and non-living materials. In order to be able to do so, they are expected to have acquired knowledge, attitude, and skills in chemistry in reference to the mastery of theories, laws, principles, concepts, and essential phenomena in the science of chemistry and its branches. They are expected to plan and perform laboratory work in basic scientific fields, use the science of chemistry to solve problems in nature and the environment both qualitatively and quantitatively. Furthermore, they are expected to have a sufficient scientific foundation to continue studies to the Master's level and pursue in life-long learning activities. Graduates are expected to become researchers and industry developers, research assistants at research institutes, chemical analysts, and quality control supervisors with such a profile.

Graduates of the Bachelor's degree programme Science Education are expected to be capable to apply science in Science Education, in laboratory management, and edutainment entrepreneurship. They are expected to do so by emphasizing STEM-based learning innovation, assessment, learning media based on local wisdom and IT, and professional development of science teachers. Graduates are expected to become teachers who contribute to school graduates who are progressive, innovative, and able to adapt to the latest curriculum and technology developments to support their professional abilities.

The peers acknowledge that the programmes are designed in correspondence with the ASIIN Subject-Specific Criteria (SSC). In the reviewer's opinion, the objectives and learning outcomes of the degree programmes are well-written.

Learning Outcomes (LO) are defined for each of the study programmes under review. In general, LOs consist of a number of competence areas. For education study programs, there are the following three competence areas: (1) religion, social attitude, and professional ethics; (2) basic and general sciences (biology, physics, and chemistry); and (3) general and specific pedagogy. Meanwhile, for non-education study programs, there are the following three competence areas: (1) religion, social attitude, and professional ethics; (2) basic and general sciences (biology, physics, and chemistry); and (3) advanced sciences. Tables are provided in the SAR displaying the LOs distribution for each of the five study programmes.

They also observe that the students of the five degree programme are duly informed about the study objectives, qualification requirements as well as job prospects. Apart from the publicly available information on the degree programmes students report they are regularly and appropriately informed by their lecturers and academic advisers.

Internal and external stakeholders are explicitly included in the development of the learning objectives and the definition of the qualifications outcomes. All five study programs formulate learning outcomes based on two main factors, namely, internal and external factors. Internal factors consist of the visions and missions of the university, faculty, and study programs (strengths and weaknesses of the study programs are considered). External factors include the Indonesian National Qualifications Framework (KKNI), scientific expertise consortia (the Indonesian Biology Consortium, the Indonesian Chemical Society, and the Indonesian Society for Science Educators), stakeholders (alumni's employers, alumni, students, and faculty staff), national strategies, and benchmarking against national and international universities with the same study programmes.

The students and alumni interviewed feel sufficiently trained by their degree programme to be able to find a suitable employment upon graduation, in terms of the scientific and

teaching qualifications (the latter for the three programmes in Education) as well as entrepreneurial skills. The alumni present in the audit report that they found an employment relatively shortly after they graduated. This is the case both for the three education degree programmes and, e.g. for a graduate of the Biology degree programme as environmental specialist in the field of maintenance in a large power plant. This impression complies with the outcomes of the alumni statistics as part of the Annexes. The peers gain the impression that the Bachelor's degree programmes appropriately qualify their graduates to optionally continue with their higher education studies in the context of a Master degree programme.

Based on the assessment of the SAR and the audit, the peers find that the learning objectives and expected qualification outcomes for the Bachelor degree programmes in Biology Education, Chemistry Education and Science Education should be more explicitly elaborated in terms of the teaching qualifications aimed at during the studies, in order to qualify graduates for the position as teacher, which are at current stage too generically defined.

To sum up, the peers agree that the qualification objectives of all five programmes adhere to level 6 of the European Qualification Framework, which relates to Bachelor's programmes, and to the respective ASIIN Subject-Specific Criteria of the Technical Committees 09 and 10, respectively. They appreciate that a regular review process for assessing and continuously updating the objectives and learning outcomes is in place, involving all relevant stakeholders. The only room for improvement is formulated in terms of the teaching qualification learning objectives and intended outcomes which should be specified.

Criterion 1.2 Name of the degree programme

Evidence:

- Module handbooks
- Self-assessment report
- Discussion during the online audit

Preliminary assessment and analysis of the peers:

The reviewers find that the degree names duly match the intended study aims and learning outcomes of the Bachelor programmes under review. Recommendations from relevant professional organisations e.g. the Indonesian Chemical Society and the Indonesian Biology Consortium are adequately considered. The reviewers do not find it self-evident from the title of the Bachelor's degree programme Science Education to identify the career perspectives of graduates. However, from the documents presented and the discussions with the representatives of UM, they agree that sufficient information is provided and students and

stakeholders are duly informed about the study objectives and intended qualification outcomes in a transparent manner and that changes of the title are not required.

Criterion 1.3 Curriculum

Evidence:

- Self-assessment report
- Module descriptions and module handbooks
- Website
- Discussions during the online audit

Preliminary assessment and analysis of the peers:

The curricula of the five degree programmes comply with the programme objectives and learning outcomes, and are subject to continuous revision processes. The last evaluation was conducted in 2020 to redesign the 2018–2019 Curriculum according to the Decree of the Minister of Education and Culture Number 3/2020 on the Independent Campus and Freedom of Learning policy. The evaluation involved the curriculum board, study programme coordinators, teaching staff, students, alumni, and other stakeholders.

The minimum study workload assumed by a student is 146 credits, which consist of 110 credits (78%), deriving from compulsory courses and 36 credits (36%) from elective courses. The curriculum is divided into three categories: Compulsory courses comprise A) Basic courses on character development (12 credits) and B) Subject matter courses and experiments (98 credits); the third category C) entails elective and transdisciplinary courses (36 credits). Courses under category A (basic courses on character development) cover Religion (students can choose Islam, Catholicism, Christian Education, Education on Christianity, Education on Buddhism, Confucianism or Spirituality), Pancasila Education, Civics Education, Indonesian Academic Purposes as well as Innovation Management.

The three Education degree programmes under review mainly comprise subject matter courses in the first four semesters.

The curriculum structure of the Biology Education programme is based on the flow of thinking in semesters 1 and 2, comprising Basic Mathematics and Natural Sciences courses to support the ability to understand basic Biology and educational thinking. In semesters 2-5, students are provided with Basic Biology and Biology Education courses. In Semester 6-8, students are given the opportunity to develop themselves according to their field of interest, particularly through the Student Community Service as well as through self-development courses and specialisations. Students take a teaching internship either in the seventh

or eighth semester. They write their undergraduate thesis also either in the seventh or eighth semester.

In the Biology degree programme, the first two semesters are mainly devoted to Basic Mathematics and Natural Sciences courses such as „Basics of Sciences“ and „General Biology“. From the second to the fifth semester students are provided with Basic Biology and Applied Biology courses such as „Cell Biology“, „Plant Physiology“ and „Animal/Human Physiology“. The fifth until the eighth semesters mainly cover Applied Biology courses in fields of specialisation selected by the students. Character development courses are offered throughout the first until the seventh semester.

Chemistry Education: The first three semesters offer a few mandatory courses with a focus on pedagogy and chemistry education: The courses „Introduction to Education“ and „Learner Development“ in semester 1, the courses „Learning and Teaching“ and „Chemistry Learning Strategies“ in semester 3, the course „Chemistry Learning Evaluation“ in semester 4 and the course „Chemistry Education Seminar“ in semester 6). In the seventh semester students are directly exposed to school life, through the „School Field Introduction“ and the „Work-Study in the Field“ courses in the seventh semester. The degree programme offers further specialisations in the field of pedagogy, teaching methodology and evaluation through elective courses such as „Micro Teaching and Chemistry Learning“ (in the fourth semester), „Basic Teaching Ability“ and „ICT Basic Learning Design“ in the fifth semester and „Review of School Chemistry“ I and II in the fifth and sixth semester.

Chemistry: In the Chemistry degree programme, the first four semesters are primarily filled with basic courses on character development and subject specific courses such as Basic Chemistry I and II, Mathematics, Physics and Biology for Chemistry, Basic Chemistry Laboratory I and II, Chemistry Research Methodology, Organic and Inorganic Chemistry courses and laboratory courses. From the fourth until the sixth semester students can furthermore choose one elective/transdisciplinary course and take further subject matter courses such as Environmental Chemistry, Biochemistry Laboratory. In the seventh semester they select three courses from the elective category and undertake a Fieldwork Practice and Student Community Engagement, while the eighth semester is solely devoted to writing the undergraduate thesis which is sometimes also used for an extended internship duration. Students participate in laboratory courses from the 1st semester on. In the Elective and Transdisciplinary Courses students select courses accumulating to 36 credits (out of a course offer amounting to 86 credits) such as Green Chemistry, Food Chemistry, Biotechnology, Microbiology, Chemistry in Daily Life.

Based on the assessment of the SAR and accompanying documents and the audit, the peers gain the impression that the study programmes reflect the level of required academic qualifications and learning outcomes relevant for the qualification level of the European Qualification Framework (level 6 for Bachelor's degree programmes).

Science Education: The curriculum is structured compared to the Biology Education and Chemistry Education programmes and comprises the same share of subject specific courses which mainly entail courses on Chemistry, Biology and Physics, including laboratory courses and courses on education and school management.

Based on the assessment of the SAR and accompanying documents and the audit, the peers gain the impression that the study programmes reflect the level of required academic qualifications and learning outcomes relevant for the qualification level of the European Qualification Framework (level 6 for Bachelor's degree programmes).

In terms of the Bachelor's degree programmes Chemistry Education, Biology Education and Science Education the reviewers estimate that with the currently applied share in the curriculum setup, of 80% subject matter courses and 20% courses focusing on the acquisition and advancement of teaching skills, the focus on education is insufficiently weighted in the curriculum and should be enhanced.

Concerning the practical experience in schools, the reviewers consider early-stage internships essential for a timely acquisition and testing of teaching skills, while the school internship (via "School Field Introduction" and "Work-Study in the Field") takes place not earlier than in the seventh semester. The peers welcome that UM representatives report during the audit that school trips are implemented already at earlier stages. However, they cannot find this explicitly reflected in the study plans. The peers suggest internships designed as starting with group teaching, followed by teaching in the classroom, observation, micro-teaching and research in the field of schools (through classroom action research, research in the field). They appreciate that students can request for additional courses on how to teach, that they can participate in these courses at a special teacher training campus and can integrate the credits within their study programme. They also acknowledge the flexibility of the programmes when it comes to the option to extend the duration of the internships.

The reviewers conclude that there are support mechanisms in place to enable a demand-oriented course selection and emphasise that a further enhancement of didactical and pedagogical courses is important; more credits must be given to didactical/educational modules. Special methodological approaches in courses to enhance students' competence in didactical reflection should be integrated. They also agree that it is important for students to be exposed to the teaching practice through internships earlier than currently planned,

in order to be confronted with real school scenarios and to tackle classroom challenges as early as possible to invest in their teaching skills. Furthermore, internships should be designed to build on each other (observation, micro-teaching, research in the field of schools) which should be reflected in the curriculum.

In all five study programmes, students have the chance to enhance their English skills through courses such as the elective courses “English for Scientific Presentation” and “English for Chemistry” in the Chemistry degree programme, and through the elective courses “English for Chemistry” and “English for Scientific Writing” in Chemistry Education. In the Biology and Biology Education Bachelor’s degree programmes there is a compulsory course integrated into the curriculum, “English for Biology” in the first semester, Biology Education also offers the elective course “Teaching Biology in English”. In the Science Education degree programme, students can choose the elective course “English for Natural Sciences” and “Teaching Science in English”.

The peers recommend to extend the course offers in English for students to be able to improve their English skills and to be prepared for potential international mobility.

Excursions are in some cases already integrated in courses as has been reported by the programme coordinators, the teaching staff as well as the students and alumni. The peers encourage to further increase of the number and type of excursions in order for students to be exposed to different learning environments and to enhance their independent learning approach to experiments. Furthermore, students should be involved more in practical areas, for instance in the environmental field. Also the peers would find it of added value if the character development courses stimulated discussions and reflections of students.

The school representatives are very satisfied with the students’ performance demonstrated during school internships as well as after graduation. They find that both students and graduates are adequately trained, teach according to the required standards and have a solid methodological repertoire expected for modern teaching performance.

The Module Handbooks are published on the Faculty websites. For the five degree programmes the information is only provided in English however, not in the language of instruction (Bahasa Indonesian). For the degree programme Chemistry, information about the curriculum can also be found only in English. For the other four degree programmes under review information about the curriculum structure can be found in Indonesian as well as in English, for Science Education impressively altogether in eleven languages.

Overall, the peers assess the curricular structure and setup of the five degree programmes as appropriately high for reaching the intended learning objectives and qualification outcomes. While there is a mix between theory and practice, the practice element should be

enhanced in favour of practice-based, problem-oriented and inquiry-based learning, the introduction of further excursions and presentations into the curricula (all degree programmes) and an increased share of teacher education/didactics (for the Biology Education, Chemistry Education, Science Education programmes).

Criterion 1.4 Admission requirements

Evidence:

- Self-assessment report
- Website
- Discussions during the online audit

Preliminary assessment and analysis of the peers:

Applicants of the five Bachelor's degree programmes must meet the academic and administrative requirements stipulated by UM. Applicants are graduates of the SMA/MA- (senior high school) level Natural Sciences study program, public or private. They must take and pass from the admission selection in either:

- the National selection of Higher Education or University (Seleksi Nasional Masuk Perguruan Tinggi Negeri (SNMPTN),
- the joint selection of Higher Education or university (Seleksi Bersama Masuk Perguruan Tinggi Negeri (SBMPTN) or
- Independent Selection tracks (Seleksi Penerimaan Mahasiswa Baru, SPMB).

For each academic year, the university determines the ratio of students admitted through the above described admission paths. The decision of the Rector of Universitas Negeri Malang No. 28.1.50/UN32/KM/2020 on the Capacity and Patterns of New Student Admissions of Universitas Negeri Malang for Academic Year 2020/2021 establishes that the portions of new students admitted from the SNMPTN, SBMPTN, and Independent Selection tracks must be at least 20%, at least 40%, and at most 30% of the total capacity, respectively. The capacity and entry rates are provided for the last three academic years for each of the five study programmes.

The number of applications exceeds the number of admitted students. For the academic year 2020/21, the ratio is between 1:7 for Biology Education and Biology, 1:4 for Chemistry Education and the Chemistry and 1:6 for Science Education. The programmes have admitted between 137 (Science Education degree programme) and 170 students (Chemistry degree programme) each year. The reviewers notice that there has been a considerable drop in applicant numbers over the last two years, where numbers were at least twice as high in

all five degree programmes. During the audit they are informed about the increasing number of competing universities offering the degree programmes in question. However, the peers emphasise that it is important to maintain and uphold the attractiveness of the degree programmes to increase the efforts of promoting the degree programme by explicitly addressing potential future students in order to be able to select a sufficient number of suitable candidates also in the future.

The admission website informs potential domestic and international students about the requirements and the necessary steps to apply for admission into the programmes. Since the rules are based on decrees by the Ministry of Education and on the UM's written regulations, the peers deem them binding and transparent.

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

The peers thank Universitas Negeri Malang (UM) for their statement concerning the definition of qualification outcomes. They follow UM's explanation and consider the definitions of the qualification outcomes of the programme as adequate.

The peers also thank UM for differentiating its course offer in terms of subject-specific courses, pedagogical courses and social attitude and professional ethics. For the Bachelor's degree programme Chemistry Education, Biology Education and Science Education the auditors conclude that the number of pedagogical courses is still too low and that the relation between subject matter courses and pedagogical courses should be modified in order to foster the educational qualification of students.

Concerning timing of the school and teaching experience in the curriculum, the auditors appreciate that students have more opportunities for practical try-outs of teaching skills than what could be gathered from the documents. However, they miss longer exposure to school settings at an early stage of the educational study programmes, such as through internships. School trips and excursions provide only limited chances for in-depth practical learning. The peers conclude that several weeks of internships after the second semester would be preferable and advisable for the educational programmes.

UM's plan to offer at least one additional full English course for each of the study programmes under review (BBIO-EDU and BBIO: Research Methodology and Technique of Molecular Biology, BCHEM-EDU and BCHEM: Basic Chemistry, chemistry education research methodology, BSE: Basic Physics) is positively noted. The auditors recommend to increase the number of English taught courses even more by adding more courses encouraging students to hold presentations in English.

UM states that it acknowledges the comment about the lack of excursion activities in the curriculum and that it will issue the request to the provost, which is in correspondence with the peers' recommendation to foster experience and inquiry based learning methods in the curricula.

The auditors appreciate that UM has updated and completed information about the study programmes on its website, which is now available in eleven languages for all five degree programmes under review. The module handbooks are also duly published and easily accessible.

They support UM's actions to promote the degree programmes and secure its visibility which is in line with their recommendation to continuously engage in actions to promote the degree programmes.

In summary, the auditors regard criterion 1 as partially fulfilled.

2. The degree programme: structures, methods and implementation

Criterion 2.1 Structure and modules

Evidence:

- Self-assessment report
- Study plans
- Module handbooks
- Objective-Module-Matrices
- Discussions during the online audit

Preliminary assessment and analysis of the peers:

The five Bachelor's degree programmes are designed for a study period of four years. Students must achieve 146 Credits which is equivalent to about 234.45 ECTS. Each semester comprises 16 weeks of learning activities, including one week for midterm exams and one week for final exams. The five Bachelor's study programmes foresee both compulsory and elective modules. The compulsory modules in the degree programmes Biology and Chemistry entail 12 credits (19.04 ECTS) for courses on character building, 90 credits (143.73 ECTS) for courses on subject matters as well as 4 credits each (7.28 ECTS) for student community engagement and an internship. In the Bachelor Education, the Chemistry Education and the Science Education degree programmes, 12 credits (19.04 ECTS) are foreseen for

courses on character building as well, 8 credits (12.69 ECTS) relate to courses on education, there are 82 credits (131.04 ECTS) granted for courses on subject matters as well as 4 credits (7.28 ECTS) each for student community engagement and teaching internships. The elective courses in all five study programmes amount to 36 ECTS.

For each degree programme under review there is a module handbook informing about the type of courses, the contents covered in the courses, the number of course sessions, workload, content descriptions, examination regulations, learning strategies and how to achieve the Learning Outcomes (LOs). The module handbook can be accessed by students, lecturers, and stakeholders on each study program's website.

After analysing the module descriptions and the study plans, the peers confirm that all five programmes under review are divided into modules and that each module is a sum of coherent teaching and learning units. All programmes contain adequate practical elements and allow the students to define individual focuses through broad ranges of electives (see chapter 1.3 for more detail).

To sum up, the peers are convinced that the choice of modules and the structure of the curriculum ensures that students can reach the intended learning outcomes in the five degree programmes under review. However, the module descriptions are not always clear regarding the mandatory and recommended prerequisites for taking certain modules. It is important that prerequisites are clearly and explicitly described in the module descriptions in order to enable students to plan their studies. The peers ask UM to review the module handbooks accordingly.

International Mobility

The SAR and the representatives of UM during the audit inform the reviewers that UM encourages international mobility through its curriculum structures and the engagement and support of its teaching staff in the five degree programmes.

A list of the student exchanges realised in the years 2018, 2019 and 2020 is provided as part of the Appendices. The tables reveal that in all five study programmes a limited number of students took the opportunity to go abroad during their studies. Mostly they undertook a short duration stay at a partner university such as in the context of a 1-4 weeks (teacher) internships or a short-duration mobility programme. Only in a limited number of cases students spend a full semester abroad. International mobility engagement during the pandemic in 2020 was characterised by the participation of students in online courses. In most cases the Universiti Teknologi Malaysia (UTM) is listed as hosting university, which demonstrates a highly engaged collaboration between UM and UTM.

The university has established its own scholarship for international mobility and moreover manages various external scholarships sponsored by the Indonesian government, the US government or the European Union. Qualifications obtained at other universities in Indonesia or abroad are recognised in line with the courses at Universitas Negeri Malang. Before a stay abroad, the university concludes a learning agreement with the respective student to ensure that the courses taken are relevant to the study programme and can thus be recognised. The students can best realise such a stay in semesters 3 to 6 or, in case of a shorter stay, during the holidays. As they confirm, there are no problems with credit transfer or the organisation of student mobility. Recognition of these activities is set out in UM's student guidebook. In the peers' opinion, it is important to communicate clearly to the students, in which stages of the programme mobility is most suitable and easiest to organise.

The reviewers welcome that no barriers are identifiable in terms of the acknowledgement of internships (laboratory practicums, field practicums, field visits, study abroad stays) undertaken at campuses overseas which can be recognised as compulsory modules of the studies programme. Also student community engagement and (teaching) internships can be accepted as replacement of mandatory courses for all five degree programmes. They welcome that students have the opportunity to attend international seminars.

To sum up, the peers appreciate the efforts of UM and the staff members to promote student mobility and the fact that no boundaries are identifiable in terms of credit recognition. They notice that student mobility numbers to higher education institutions in Indonesia or abroad are still relatively low. Also, the majority of study related stays abroad are of a relatively short duration, limiting its impact on the overall study experience. The reviewers emphasise the benefit of students to be able to undertake several months abroad already during the first cycle of higher education, of Bachelor's programmes, and emphasise that this would boost useful subject-specific and transferable skills (particularly English and intercultural competencies) relevant for future employment, not only abroad.

Criterion 2.2 Work load and credits
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Evidence:

- Self-assessment report
- Study plans
- Module Handbooks
- Discussion during the online audit

Preliminary assessment and analysis of the peers:

The calculation of student workload refers to Regulation of the Minister of Research, Technology, and Higher Education No. 44/2015 as amended to Regulation of the Minister of Research, Technology, and Higher Education No. 50/2018 on Higher Education Standards and is set out in UM's catalogue.

One semester consists of 16 weeks of classes, including 14 weeks of instructional activities, one week of mid-term examination (UTS), and one week of the final examination (UAS). The minimum study workload assumed by a student equals 146 credits, which consist of 110 credits (78%) derived from compulsory courses and 36 credits (36%) from elective courses. The conversion of credits to ECTS is based on the multiplication of the credit load of a course by 170 minutes (for theoretical and practical course activities) and 14 weeks and by dividing the result by 25 hours. According to the information provided in the SAR, ECTS calculation is based on instructional activities, excluding mid-term examination and final examination. However, examination must be mandatory parts of the modules and should be included in the ECTS calculation. The peers ask the university to apply this conversion rate uniformly in all module handbooks to correct the noted inconsistencies.

For the course types of lectures, responses and tutorials, the total workload for 1 credit per week (170 minutes) are divided in terms of contact times (50 minutes), structured assignment (60 minutes) and independent study times (60 minutes). For seminars or similar courses, the 100 minutes are devoted to contact time and 70 minutes to independent studies. For practical courses such as practica, workshop practica, field practica, research and community service etc., there is no indication of the times foreseen for contact time, structured assignments and independent studies.

The peers acknowledge that a credit point system based on the students' workload is in place. Information detailing the times allocated to attendance and self-study should be specified in the module handbooks of all course types of the five study programmes.

The workload in the five degree programmes appears realistic and manageable. There is a low number of drop-outs, particularly in the advanced semesters which demonstrate that students manage to successfully undertake and finalise their studies. The students report that they consider the workload high but manageable. The peers conclude that it is important to regularly monitor the workload and to be able to take corrective actions if needed (see criterion 3).

With the exception of the last two semesters, the workload is spread relatively evenly with each semester. According to UM's Education Guide, students are entitled to programming for a maximum of 20-24 credits per semester. The regular study plans of the five degree programmes under review indicate between 19 and 22 SKS per semester. The workload of

the last two (Science Education, Chemistry Education) and last (Chemistry, Biology, Biology Education) semester/s is however markedly reduced in order to give students enough time to work on their thesis, to potentially extend their internship duration and/or to already apply for a job. The effective number of SKS students take depends on their performance in the previous semester. If their Grade Point Average (GPA) is less than 2.0, students can take a maximum number of 16 credits, if their GPA is between 2.0 and 2.99 they up to 20 and with a GPA above 3.0 up to 24 SKS the next semester. This mechanism is supposed to ensure that students can handle the overall workload. In fact, students can theoretically finish their studies in less than 8 semesters, but due to the high workload in general, this is only rarely the case. The peers are satisfied with the distribution of the workload and they see that there are no structural peaks.

As has already been mentioned, the vast majority of the students in all five study programmes manage to finish their studies on time. The statistics on the on-time graduation rates indicate that there was a reduction of students managing to graduate in time in the year 1019/2020 which is plausibly explained by UM by the delay in student progress due to study and research restrictions at campus and at home. Moreover, the dropout rates are very low in general, with the exception of a sudden peak in 2019 due to a change in government regulations regarding dropouts. Therefore, the peers conclude that the general workload is high but manageable, which is confirmed by the students. At the moment, there are no mechanisms in place to inquire how much time the students effectively need for each individual module. The peers cannot detect an urgent problem with the current workload, but they would appreciate if the university could introduce such mechanisms. A systematic monitoring of the student workload for the individual modules, e.g. in the context of the course evaluations would be beneficial.

Criterion 2.3 Teaching methodology

Evidence:

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

Preliminary assessment and analysis of the peers:

The teaching and learning methods employed in each course are laid down in the module handbooks. Through the Indonesian regulations on credit points (see Criterion 2.2), an adequate balance between face-to-face activities and independent learning is intended. In

the programmes under review, various student-centered learning methods are applied. Besides the regular lectures, cooperative learning, project- and problem-based learning, inquiry and experiments are used in the courses. The students confirm that these methods are actually used and report that they are satisfied with the variety of teaching methods. They emphasise that they are involved in research projects and can engage in publications. The teaching and learning activities are supported by a broad range of media, both traditional (books, papers) and online (video, presentations etc.). The university's online learning management system effectively supports teachers and students in communicating and disseminating learning material.

During the audit, the reviewers are informed about the fact that the Indonesian government requires high schools to implement questions that foster high order thinking skills of students in order to increase Indonesian students 'performance in PISA. The university has developed new teaching methodologies based on inquiry based and student centered approaches, stimulating critical thinking. Assessment forms are aligned to these new learning and examination types which is appreciated by the reviewers. According to the students, independent thinking and problem-based learning is continuously fostered in the laboratory work, with students working in pairs and discussing their results with the lecturer and their peers during the lectures.

The discussion with the students and alumni revealed that students benefit from the tips and tricks brought forward by the teaching staff. Asked about their best teaching-related experience during their studies, students also report about their internship experience and how this enhanced their competencies to professionally act in a school environment and to teach and motivate students. Access to one of the best schools in Malang city for the internship was also welcome.

To sum up, the reviewers assess the teaching methodologies employed in the five degree programmes as sufficiently diverse and supportive for reaching most of the learning objectives. The programmes would benefit from a further substantiation and enhancement of the inquiry-based, problem-based approaches. For this aim, an increase of student-led experiments, presentations and excursions which to a certain degree are already applied in some of the modules, would be beneficial and foster independent and critical thinking. The module handbooks should be updated and specified accordingly.

Criterion 2.4 Support and assistance

Evidence:

- Self-Assessment Reports
- Website

- Discussions during the audit

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 by means of study programme coordinators, academic advisers, course lecturers, administrative staff, laboratory staff and practicum assistants.

Study Programme Coordinators are the leaders at the study programme level and are responsible for organizing academic activities in the study programs over which they preside.

The main contact for students throughout their study duration are academic advisors, one adviser, a lecturer, is assigned to each student in their first semester. Academic advisors provide academic guidance at least three times per semester (at the start, middle, and end of the semester) either offline or online. In addition, they monitor the learning progress every two weeks and provide supervision if needed. Their main tasks relate to guiding students on completing their studies on time, giving advice and approval for students with GPAs lower than 2.00, creating links to counselors where relevant and giving consultation and consideration in selecting prospective graduates' field of specialization/course package and/or capability development. Academic advisers can be consulted any time during their working and office hours and the students interviewed report of no problem in terms of their accessibility, and quality of support is deemed as sufficiently high.

Lecturers who conduct classes monitor students' attendance, present lectures using relevant methods, evaluate the learning outcomes and report to the study program coordinators in the case of a significant problem in the classes. Laboratory staff comprises educational personnel in charge of assisting students when conducting practicums, maintaining laboratory equipment and supervising the student progress during the lectures.

Furthermore, students are supported by Bachelor's thesis advisers that guide students in planning and implementing research and in reporting the results for their final project.

In addition, support is offered through practicum assistants, i.e. students who – on a part-time basis alongside their studies – provide tutorials or guidance to other students conducting practicums under the guidance of course lecturers.

The university supports the students in finding a job in various ways. The programmes offer a course on entrepreneurship in which students learn how to develop a business model and how to start a company. Moreover, UM organises regular job fairs and trainings about writing applications and creating CVs.

The website shows that there is also a system to support students with disabilities. The university has established a center for special needs education supporting this target group in their learning process as well as teaching staff to develop accessible learning media. The facilities for the five degree programmes are accessible for students with disabilities.

Information and support measures also include information about chances of career development during the studies. The students are content with the support mechanisms in place, also about chances for international mobility (study abroad, internships). Students furthermore feel sufficiently informed about where to find relevant literature resources and how to distinguish the quality and reputation of journals in the particular discipline.

Moreover, students feel well supported also through the consultation group with teaching staff organised through WhatsApp groups.

The peers conclude that sufficient resources are available in order to provide individual assistance, advice and support for all students, helping them to achieve the intended learning outcomes and to successfully complete their studies.

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

The peers acknowledge UM's plan to specify times foreseen for attendance based and self-study in the module handbooks of all course types of the five study programmes.

They maintain their view that it is mandatory that the workload system specifies the times foreseen for attendance-based studies, self studies and examination; such information must also be provided for the practical courses.

UM's plan to regularly monitor the workload in order to be able to take corrective actions if needed is positively noted. The peers propose to uphold the respective recommendation.

The ECTS was recalculated, including times foreseen for examination. The conversion rate from SKS to ECTS is now applied uniformly in all modules (1 SKS = 2 ECTS, 2 SKS = 3 ECTS, 3 SKS = 5 ECTS, 4 SKS = 6 ECTS). The total amount of ECTS has been adjusted accordingly: BBIO-EDU: 221 ECTS, BBIO: 222 ECTS, BCHEM-ED : 222 ECTS, BCHEM: 221 ECTS, BSCI-EDU: 221 ECTS.

The peers thank UM for its plan to enhance the inquiry-based, problem-based approach in its study programmes and to update the module handbooks accordingly.

After assessing the statement of Universitas Negeri Malang as well as the additional documents, the peers deem this criterion partially fulfilled.

3. Exams: System, concept and organisation

Criterion 3 Exams: System, concept and organisation
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Evidence:

- Self-Assessment Report
- Module descriptions
- Exam regulations
- Exemplary written exams and final theses

Preliminary assessment and analysis of the peers:

Examination at UM is based on UM's 2020 Education Guide where rules and regulations are specified. According to the Guide and as confirmed by the lectures and students, the course lecturers develop an examination schedule which is made accessible to students by the start of each semester. Information about examination includes mid-term (conducted in week 8) and final examination (in week 16) as well as assessment criteria and weighing. To avoid peaks, overall coordination of the semester's examination schedule is undertaken by the programme coordinator and communicated to the lecturers. Exams are structured to cover all of the intended learning outcomes (knowledge, skills and competences). Exams are module-related and offer students continuous feedback on their progress in developing competences. The five degree programmes comprise a final thesis which ensures that students work on a set task independently and at the level 6 of EQF aimed for.

The self-assessment report and the online audit reveal that there are mechanisms in place to secure that students are clearly informed about what is required from them in order to pass the module. All examination related information is provided in the first course and accessible via the online portal before the start of the semester.

However, forms and requirements of the examination are not always specified in the module descriptions of the module handbooks, e.g. it is not sufficient to mention that there will be a mid-term, a final examination, a summative examination and individual assignments but to provide further information on what specific forms of examination will be applied and what is expected of students in order to pass the exam. The peers ask UM to update the module handbooks accordingly and to provide details about examination for each module.

The students report that sufficient time is allocated for exam preparation and structures are established to ensure that exams can be undertaken without preventing them to successfully implement other study related activities. This is also related to the exam forms foreseen for the different types of courses. Exam days are from an organisational aspect

well arranged in the department. Upon request by the peers the students mention that they use the opportunity of repeating exams, mostly in case they have failed an exam in previous semesters but also because of having undertaken an internship of an extended duration.

The teaching staff follows rubrics which are established in accordance with the national standards. Students agree that rubrics are used in a transparent and adequate manner. During the audit, the peers request samples of rubrics and find that they are relevant and suitable for the study contexts in which they are applied.

The peers acknowledge that in the degree programmes Biology Education, Chemistry Education and Science Education assessment forms and questions are applied to stimulate critical thinking and inquiry based learning. However, they are not yet convinced that inquiry based approaches are fully developed in the three degree programmes and should be more explicitly incorporated in the curriculum via appropriate choices for examination types and questions.

If a student is unsatisfied with his/her final grade for a course, he/she is entitled to make an appeal on the grade to the course lecturer during the appeal period. If a student is declared failing in a course, he/she is allowed to re-program for the course in the following semester. This is as set out in UM's Education Guide Article 61.

The peers are impressed by the structures in place to encourage and support students in finalising their thesis. There are regular meetings to guide the students' progress. Students are encouraged to publish their thesis or to present it at a conference, together with their supervisors. Evidence is provided of thesis that have factually been published at national and international level, which is a good sign of recognition of the students work and a motivation for generating high quality work.

During the audit the students report that the overall workload is manageable (see chapters 2.1 and 2.2) but that sometimes, extra time has to be invested to repeat courses. The reviewers notice that there is a relatively high number of exams per semester, also related to the small size of many modules, and that together with smaller forms of student examination during the courses, e.g. through quizzes and other tests, there is a high workload for the students related to examination. The peers ask UM to observe this situation on a continuous basis in order to ensure that the number of exams and the workload remains controllable (see criterion 2.2 Work load and credits).

Overall, the peers are satisfied with the regulations of examination in the five degree programmes. They appreciate the transparent procedures set up by UM. Students confirm that the module requirements and exam dates are communicated to them at the beginning of

each semester and that the grading system is transparent. Following the inspection of the samples of examination papers and final theses the peer are satisfied with the general quality of the samples, which is appropriate for the Bachelor's level of higher education.

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

The auditors notice that forms and requirements of the examination are not always specified in the module descriptions of the module handbooks, e.g. it is not sufficient to mention that there will be a mid-term, a final examination, a summative examination and individual assignments. They regard information about the specific forms of examination and what is expected of students in order to pass the exam as essential. The peers acknowledge that UM will update the module handbooks and will provide details about examination for each module. Until then the peers suggest to maintain the requirement.

They appreciate that UM plans to integrate inquiry-based learning elements into the course portfolio which will be reflected also in the updated examination types and questions.

The peers acknowledge that – in terms of the identified high number of exams per semester and the importance to regularly monitor the student workload – UM's faculty intends to evaluate the number of exams per study programme.

The peers regard criterion 3 as partially fulfilled.

4. Resources

Criterion 4.1 Staff

Evidence:

- Self-Assessment Report
- Staff Handbook
- Study plans
- Module descriptions
- Discussions during the audit

Preliminary assessment and analysis of the peers:

The total number of lecturers in the Biology Department is 49: 49 lecturers teaching in BBIO-EDU (13 BBIO-EDU lecturers and 36 BBIO lecturers) and 36 teachings in BBIO. Almost half (24 of 49) of the lecturers have a Master's level, the remaining lectures at least a Doc-

toral degree. The peers appreciate UM's plan to continuously enhance the share of teaching staff with a doctorate and to encourage lecturers with a Master's qualification to pursue continuous studies at home or overseas. This is especially relevant for the Science Education Programme where the majority of teaching staff members – deriving from the Physics, Chemistry and Biology departments – have a Master's degree (22 of 35). The Chemistry Education and Chemistry programme benefit from a higher share of teaching staff with a doctoral qualification (21 out of 27 for Chemistry, 22 out of 31 for Chemistry Education). The peers recommend to hire more staff with doctoral and postdoctoral experience overseas, funded through respected organisations such as the Fulbright programme (USA), the A.-von-Humboldt Foundation (Germany), the Japanese Society for Promotion of Science (JSPS, Japan).

The academic staff is involved in a significant number of research projects funded by grants from the Indonesian government, UM or other research funds. Over the last years, UM has aimed at increasingly strengthening its research focus, resulting in a considerable number of publications. During the audit UM representatives give evidence about student engagement in projects and publications, mostly in the context of the Bachelor's theses.

From the information provided in the SAR, the staff handbooks and during the audit, the peers are convinced that the teaching staff in the five degree programmes is appropriately selected, adequately trained and equipped with relevant skills and competencies. They welcome their engagement in research activities and of feeding research results and activities into the courses. The reviewers also appreciate that UM recognises areas worth improving in terms of aiming to secure a good share of experienced and highly qualified teaching staff e.g. through further qualification of lecturers with a Master's degree.

Criterion 4.2 Staff development

Evidence:

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

Preliminary assessment and analysis of the peers:

Lecturer and educational personnel development is carried out by the study programs and the faculty based on the university's guide as set out in Regulation of the Rector of Universitas Negeri Malang on Work Program Policy. Improvement of lecturers' standard is performed under different schemes. UM has a policy to actively support candidates in pursuing their doctoral studies. Since 2009, new UM lecturers are obliged to pursue further studies to the Doctoral level overseas which is supported by English training and advanced study

programmes under a cooperative scheme with Universiti Teknologi Malaysia and Osaka University. Currently, 5 lecturers from the Biology Department, 5 lecturers from the Chemistry Department, and 6 Science lecturers are pursuing Doctoral studies.

Also the system of sabbaticals for the staff with possibilities for research abroad funded through foundations as exemplarily mentioned in 4.1 should be stimulated especially for staff members at the early career stage.

UM fosters didactic development of lecturers through trainings and workshops within UM as well as abroad, two of the UM trainings are obligatory for all lectures (Instructional Skills Improvement, Applied Approaches). They are complemented by online instruction, qualitative data analysis, life-based assessments and video-making trainings. UM furthermore offers specific schemes and grants to foster collaboration with other universities, to stimulate joint research and publications and to participate in workshops and conferences at national and international level. It also has a mentoring programme provided by senior lecturers (incl. in team teaching).

The interviewed teaching staff and representatives from the collaborating schools are convinced that sufficient incentives are provided by the HEI to improve their teaching and the quality of their lectures. In the three educational degree programmes lecturers can gain valuable practice-oriented experience to apply classroom action research in order to improve their teacher performance.

To sum up, there are suitable and sufficient structures and measures in place to enable continuous support for staff members to develop their skills, both in terms of enhancing methodological skills as well as to ensure and maintain a high quality of their teaching performance.

Criterion 4.3 Funds and equipment

Evidence:

- Self-Assessment Report
- Videos and presentation of the facilities
- Discussions during the audit

Preliminary assessment and analysis of the peers:

The peers gain the impression that the equipment, instruments and classroom of the study programmes are of overall high quality, contributing to reaching the training objectives for the laboratory and practical training. The survey results show that, depending on the degree programme, only one out of three to seven students gives the highest score on this question. The peers therefore recommend to provide a concept to ensure that tools and

instruments for student training in practical courses are sufficient in terms of number and condition (e.g. microscopes, cameras for nature observation and documentation).

The review team appreciates the mechanisms to deal with situations in which laboratory equipment is missing and are informed about collaborations with other universities in which materials are shared. It is also appreciated that students and alumni can inform the representatives of the study programme any time if they need more or other laboratory tools, software or other resources. It is also positively noted that the regular maintenance of laboratories and its equipment is ensured.

The peers are informed about frequent discussions taking place with collaborating schools in the Bachelor's programme Biology Education where teaching methods, research results and final thesis are discussed on a regular basis.

In the degree programmes Biology and Biology Education, biological materials are obtained from animals including vertebrates. It is very important to make sure that both breeding and experimentation with animals or parts of should be in accordance to international regulations on animal protection including to imply the 3R-principle (Reduce, Refine, Replace).

For the degree programmes Chemistry Education and Chemistry it is important to provide access to the best journals to enhance employability of graduates as well as international recognition of UM. The peers also find that for work in organic chemistry it is mandatory for the students in advanced semesters to have access to nuclear magnetic resonance spectrometry which is currently not the case.

University staff and students have access to Wi-Fi and can access the Internet from different locations on the campus.

Evidence is provided on how the safety measures are communicated to the students, which is realised based on a transparent procedure. Students receive instructions through a safety handbook and are informed about procedures and risk prevention in the first class of a course.

During the audit the peers could clearly identify that there is a vivid collaboration with the cooperation partners, also in terms of discussing content-related aspects and methods applied during the curriculum. The peers positively comment also on the quality of collaborations with schools, e.g. one of the schools being among the best high schools in the city. It is positively noticed that UM adapted requirements in case of changes in the industry, e.g. in the environmental management programmes. A list with collaborating partners is provided as an Appendix to the SAR, detailing the type, activities and duration of collaboration with 88 partner institutions. For the collaboration agreements that have expired or are

about to expire, it is recommended to renew the agreements and/or to initiate new collaborations.

Overall, the reviewers evaluate the quality of laboratories, equipment and collaborations generally high in the five degree programmes. The peers recommend UM to further improve equipment where needed, secure access to top literature journals and to maintain its good collaborations at national and international level.

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

The peers welcome that UM has already hired selected staff members with prior international research experience, who pursued their doctoral or postdoctoral studies abroad. They continuously recommend UM to encourage its staff to uptake international scholarships and to support sabbaticals.

The peers thank UM for its actions taken, and its declared commitment to purchase microscope and camera for 2022. As mentioned in their assessment, they recommend UM to provide a concept for ensuring that practical courses are sufficiently equipped and maintained for the entire accreditation duration.

Biology and Biology Education: The peers welcome that UM will install an ethical committee that will regulate research involving human and the use of animal models according to international standards.

Chemistry Education and Chemistry: Concerning the availability of journals the peers acknowledge UM's commitment to provide access to the best journals. They maintain that journals of the American Chemical Society and the Royal Society of Chemistry are highly recommended.

It is appreciated that UM reviews its cooperations on an annual basis for all degree programmes under review and takes appropriate actions in order to extend cooperations about to expire. The auditors emphasise the importance to initiate new collaborations whenever needed and to take this up in their review strategy and action plan.

They regard criterion 4 as mostly fulfilled.

5. Transparency and documentation

Criterion 5.1 Module descriptions
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Evidence:

- Module descriptions
- Website

Preliminary assessment and analysis of the peers:

The module handbooks for all five degree programmes have been published on the website and are thus accessible for students and stakeholders, but as mentioned (see Criterion 1.3) the information is available in English but not in Indonesian. The information provided is adequately specified in terms of the name of the module, the level where it is taught, the person responsible for the module, the contents taught, the workload (which should however, as mentioned under Criterion 2.2 include times foreseen for examination), the requirements, the module objectives, media employed, reading list and the date when the last amendment was made. As mentioned under Criterion 3 it is required to specify the examination form and requirements of each module and to define them in the module descriptions. Therefore, the peers ask UM to revise the module handbooks accordingly.

For the Chemistry and Chemistry Education programmes and to some extent also for the Biology and Biology Education programmes, which all have laboratory work, it is important that the principles of good laboratory practice and especially for analytical chemistry, the principles of traceability and quality assurance of data are included in the respective modules.

Criterion 5.2 Diploma and Diploma Supplement

Evidence:

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

Preliminary assessment and analysis of the peers:

The peers confirm that the students of all five degree programmes under review are awarded a Diploma after graduation. The Diploma consists of a Diploma Certificate and a Transcript of Records which are handed over to the students during the official Graduation Ceremony. The Transcript of Records lists all courses that the graduate has completed, the achieved credit points, grades, and cumulative GPA. Both a Diploma Supplement (DS) and a transcript in English are issued only upon request. The DS comprises necessary information about the degree programme. The peers ask the university to award these documents automatically in the future. Moreover, they would appreciate it if the amount of ECTS for individual modules could be rounded to integers in these documents, as fractional credit points are typically not recognised internationally. Information about the official

length of programme, the study requirements and mode of study (full time) should be included in the DS.

Criterion 5.3 Relevant rules

Evidence:

- Self-Assessment Report
- Website

Preliminary assessment and analysis of the peers:

The peers confirm that the rights and duties of both Universitas Negeri Malang and the students are clearly defined and binding. All rules and regulations are published on the UM's website in Indonesian as well as in English and hence available to all stakeholders. In addition, the students receive all relevant course material in the language of the degree programme at the beginning of each semester. During the online audit, the students confirm that all information is documented properly, is easily accessible and that students are well aware of all binding rules and regulations.

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

The peers appreciate that UM has revised its module handbooks for which they regard that examination forms must be further specified for all modules. They also maintain that principles of good laboratory practice for the degree programmes should be defined.

The peers acknowledge that UM attempts to secure that a Diploma Supplement (DS) will be automatically issued to all students upon graduation, which is a requirement for internationally accredited programmes. They appreciate that UM will convert the fractional credit points to the number of ECTS for individual modules and round them to integers.

The auditors regard criterion 5 as mostly fulfilled.

6. Quality management: quality assessment and development

Criterion 6 Quality management: quality assessment and development

Evidence:

- Self-Assessment Report

- Data based on surveys among students and graduates
- Discussions during the audit

Preliminary assessment and analysis of the peers:

Quality assurance in UM is implemented by the Quality Assurance Unit (SPM) in reference to the Regulation of the Minister of Education and Culture (2012) on the Organisation and Governance of UM with the main task of ensuring the quality of education, research, and community service. At the faculty level, quality assurance is conducted by the Faculty-level Quality Assurance Unit (UPM), and at the department level by the Department-level Quality Assurance Unit (GPM, in which case both serve as partners to the Dean/Head of Department in the quality assurance implementation in the academic field). It is regulated in Regulation of the Minister of Research, Technology, and Higher Education that a Higher Education Quality Assurance System has to comprise an Internal Quality Assurance System (SPMI) and an External Quality Assurance System (SPME) or accreditation system.

SPME:

The national accreditation agency BAN-PT accredits the degree programmes every five years, rendering the accreditation score A (Superior) for the Biology and the Biology Education programme, the score B (Excellent) for the Chemistry, Chemistry Education and Science Education programmes.

SPMI:

Internally, quality assurance is guaranteed through monitoring actions at the level of the study programmes, the modules, the student progress as well as alumni performance.

The quality assurance of the study programmes is controlled through Internal Quality Audits (AMI), carried out based on 9 quality criteria/standards for higher education institutions. The results are documented in a report.

The study progress is monitored each semester on a standardised procedure. Monitoring at the course level takes place three times during the semester and is based on the Faculty's monitoring policy: At the start (face-to-face activities, semester lesson plan, student attendance, obstacles during the course), in the middle (course implementation in reference to the plan, implementation of mid-term examination, lecturer and student attendance, obstacles during course), and at the end of the semester (implementation of final examination, obstacles encountered during the course, achievement of course competencies).

At the end of each semester, a student satisfaction survey is carried out for all courses

including questions about the resources, teaching methods, competence of the teaching staff etc.

Annually, a tracer study is performed in a systematic way to address alumni, both at both the university and at faculty levels. Questionnaires are filled in online via the Satisfaction Survey System webpage. Questions include the waiting time for the first job, the relevance of the curriculum and the study programme concerning the job, the services provided, the alumni's career status and the alumni's contribution to the study programme.

Surveys are furthermore done to receive alumni's employers' satisfaction, and learning monitoring and evaluation.

In the SAR and during the audit UM depicts that the University and the Faculty have a pronounced understanding of quality assurance and has established various mechanisms and tools to continuously improve the quality of the five degree programmes. Quality review processes are well defined and are well established, under involvement of all relevant actors.

In terms of the course evaluations the evaluation loop must be closed, which is currently not systematically the case. Students report that they cannot access the evaluation results, even though some teachers discuss the results with their students. Students should be informed about the results as well as about corrective actions taken based on the student feedback. The peers appreciate that some students can already see an improvement in the courses based on student feedback.

At the end of each semester, a student satisfaction survey is carried out for all courses including questions about the resources, teaching methods, competence of the teaching staff etc. The university annually carries out an alumni tracer study to find out about their job opportunities, the relevance of the skills they acquired in the programmes and other related issues.

Overall, the reviewers are satisfied with the mechanisms and measures to review the programmes, modules and student/alumni progress and performance which should be further advanced through closing the evaluation cycle by informing students about evaluation results and changes applied.

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

The reviewers thank UM for its explanation about the quality assurance and student feedback mechanisms. They welcome that students will be able to access the evaluation results

via the learning management system in the near future. The reviewers emphasise the importance to fully close the quality assurance loop by informing students also about the corrective actions taken based on the course evaluation results.

They regard criterion 6 as fulfilled.

D Additional Documents

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

D 1. Please clarify what rules have been defined for re-sits, disability compensation measures, illness and other mitigating circumstances in cae of examinations.

D 2. Please provide the full internship manuals/guidelines including a description of the experiments and evaluation matrix for the following courses:

7	NKIMUM6402	Fundamentals of Analytical Chemistry Laboratory
4	NKIMUM6204	Inorganic Chemistry Laboratory
16	PKIMUM6305	Synthesis and Isolation of Organic Compounds Laboratory

D 3. Please provide samples of mid-term and final exams for the following courses:

19	NKIMUM6203	Descriptive Inorganic Chemistry
6	PKIMUM6601	Chemistry Learning Strategy
4	PKIMUM6302	Descriptive Organic Chemistry

E Comment of the Higher Education Institution (31.01.2022)

The institution provided a detailed/extensive/ statement as well as the following additional documents :

- Updated module handbooks for the five study programmes
- Resit explanation at UM
- Explanation on research ethics committee
- Lab experiments and evaluation matrix
- Examples of mid-term and final exams

F Summary: Peer recommendations (14.12.2021)

Taking into account the additional information and the comments given by ENU 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 Education	With requirements for one year	–	30.09.2027
Ba Chemistry	With requirements for one year	–	30.09.2027
Ba Biology Education	With requirements for one year	–	30.09.2027
Ba Biology	With requirements for one year	–	30.09.2027
Ba Science Education	With requirements for one year	–	30.09.2027

Requirements

For all degree programmes

- A 1. (ASIIN 1.3, 2.1, 3, 5.1) Revise the module handbooks to ensure that types of examination and prerequisites are clearly defined for all modules.
- A 2. (ASIIN 2.2, 5.1) Ensure that the credits indicated per module also comprise times for examination and update the module handbooks accordingly.
- A 3. (ASIIN 5.2) Automatically award a Diploma Supplement in English to all students after graduation. Information about the official length of programme, the study requirements and mode of study (full time) should be included.

For the degree programmes in Biology Education, Chemistry Education and Science Education

- A 4. (ASIIN 1.3) Increase the number of didactical/educational modules.

For the degree programmes in Biology Education and Biology

- A 5. (ASIIN 4.3) Provide a concept for ensuring that practical courses are sufficiently equipped for the entire accreditation duration.

For the degree programmes in Chemistry Education, Chemistry and Science Education

- A 6. (ASIIN 4.3) Enable work with a nuclear magnetic resonance device during the laboratory practice.

Recommendations

For all degree programmes

- E 1. (ASIIN 1.3, 3, 5.1) Practical elements should be enhanced in the curriculum and the module handbooks be specified with hands-on experimentations, inquiry based and project oriented learning elements, teaching and examination methods to stimulate critical thinking as well as student presentations. It is recommended to organize excursions on a more frequent basis.
- E 2. (ASIIN 2.2, 6) It is recommended to measure the actual student workload for the individual courses in a systematic way.
- E 3. (ASIIN 6) Close the quality assurance loop and systematically communicate course evaluation results and corrective actions taken to the students.

For the degree programme in Chemistry and Chemistry Education

- E 4. (ASIIN 4.3) It is recommended to provide access to some of the best journals.

For the degree programmes in Biology Education, Chemistry Education and Science Education

- E 5. (ASIIN 1.1) It is recommended to specify the expected graduates' teaching profile.
- E 6. (ASIIN 1.3) Include mandatory teaching internships in schools at an earlier stage in the study programme.
- E 7. (ASIIN 1.3) It is recommended to design internships starting with group teaching and then teaching in the classroom (observation, micro-teaching, research in the field of schools).

G Comment of the Technical Committees 10 and 11 (02.09.2021)

Technical Committee 09 – Chemistry, Pharmacy (01.03.2022)

Assessment and analysis for the award of the ASIIN seal:

The TC agrees with the proposed requirements and recommendations proposed by the peers without any changes.

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

Degree Programme	ASIIN Seal	Subject-specific label	Maximum duration of accreditation
Ba Chemistry Education	With requirements for one year	–	30.09.2027
Ba Chemistry	With requirements for one year	–	30.09.2027
Ba Science Education	With requirements for one year	–	30.09.2027

Technical Committee 10 – Life Sciences (04.03.2022)

Assessment and analysis for the award of the ASIIN seal:

The Technical Committee agree with the proposed requirements and recommendations but the recommendations should be reworded so that they are clearly recognisable as recommendations.

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

Degree Programme	ASIIN Seal	Subject-specific label	Maximum duration of accreditation
Ba Biology Education	With requirements for one year	–	30.09.2027

G Comment of the Technical Committees 10 and 11 (02.09.2021)

Degree Programme	ASIIN Seal	Subject-specific label	Maximum duration of accreditation
Ba Biology	With requirements for one year	–	30.09.2027
Ba Science Education	With requirements for one year	–	30.09.2027

H Decision of the Accreditation Commission (18.03.2022)

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

The Accreditation Commission mostly agrees with the assessment of the peers and the Technical Committees. It discusses the assessment related to the nuclear magnetic resonance spectrometer and decides to formulate this as a recommendation instead of a requirement.

The Accreditation Commission decides to award the following seals:

Degree Programme	ASIIN Seal	Subject-specific label	Maximum duration of accreditation
Ba Chemistry Education	With requirements for one year	–	30.09.2027
Ba Chemistry	With requirements for one year	–	30.09.2027
Ba Biology Education	With requirements for one year	–	30.09.2027
Ba Biology	With requirements for one year	–	30.09.2027
Ba Science Education	With requirements for one year	–	30.09.2027

Requirements

For all degree programmes

- A 1. (ASIIN 1.3, 2.1, 3, 5.1) Revise the module handbooks to ensure that types of examination and prerequisites are clearly defined for all modules.
- A 2. (ASIIN 2.2, 5.1) Ensure that the credits indicated per module also comprise times for examination and update the module handbooks accordingly.
- A 3. (ASIIN 5.2) Automatically award a Diploma Supplement in English to all students after graduation. Information about the official length of programme, the study requirements and mode of study (full time) should be included.

For the degree programmes in Biology Education, Chemistry Education and Science Education

A 4. (ASIIN 1.3) Increase the number of didactical/educational modules.

For the degree programmes in Biology Education and Biology

A 5. (ASIIN 4.3) Provide a concept for ensuring that practical courses are sufficiently equipped for the entire accreditation duration.

Recommendations

For all degree programmes

E 1. (ASIIN 1.3, 3, 5.1) Practical elements should be enhanced in the curriculum and the module handbooks be specified with hands-on experimentations, inquiry based and project oriented learning elements, teaching and examination methods to stimulate critical thinking as well as student presentations. It is recommended to organize excursions on a more frequent basis.

E 2. (ASIIN 2.2, 6) It is recommended to measure the actual student workload for the individual courses in a systematic way.

E 3. (ASIIN 6) It is recommended to better close the quality assurance loop and systematically communicate course evaluation results and corrective actions taken to the students.

For the degree programme in Chemistry and Chemistry Education

E 4. (ASIIN 4.3) It is recommended to provide access to some of the best journals.

For the degree programme in Chemistry

E 5. (ASIIN 4.3) It is recommended to provide opportunities for students to use a nuclear magnetic resonance spectrometer.

For the degree programmes in Biology Education, Chemistry Education and Science Education

E 6. (ASIIN 1.1) It is recommended to specify the expected graduates' teaching profile.

E 7. (ASIIN 1.3) It is recommended to include mandatory teaching internships in schools at an earlier stage in the study programme.

- E 8. (ASIIN 1.3) It is recommended to design internships starting with group teaching and then teaching in the classroom (observation, micro-teaching, research in the field of schools).

I Fulfillment of Requirements (24.03.2023)

Analysis of the peers and the Technical Committees (15.03.2023)

Requirements

For all programmes

- A 1. (ASIIN 1.3, 2.1, 3, 5.1) Revise the module handbooks to ensure that types of examination and prerequisites are clearly defined for all modules.

Initial Treatment	
Peers	Fulfilled Vote: unanimous Justification: The module description have been updated and the conditions for exams repetition also with respect to the terms were addressed.
TC 09	Fulfilled Vote: unanimous Justification: The TC follows the peers' assessment.
TC 10	Fulfilled Vote: unanimous Justification: The TC agrees with the peers' opinion.

- A 2. (ASIIN 2.2, 5.1) Ensure that the credits indicated per module also comprise times for examination and update the module handbooks accordingly.

Initial Treatment	
Peers	Fulfilled Vote: unanimous Justification: The module handbook now include the required information.
TC 09	Fulfilled Vote: unanimous Justification: The TC follows the peers' assessment.
TC 10	Fulfilled Vote: unanimous Justification: The TC agrees with the peers' opinion.

- A 3. (ASIIN 5.2) Automatically award a Diploma Supplement in English to all students after graduation. Information about the official length of programme, the study requirements and mode of study (full time) should be included.

Initial Treatment	
Peers	Fulfilled Vote: unanimous Justification: The university now awards a Diploma Supplement to all graduates. The Diploma Supplement includes all necessary information.
TC 09	Fulfilled Vote: unanimous Justification: The TC follows the peers' assessment.
TC 10	Fulfilled Vote: unanimous Justification: The TC agrees with the peers' opinion.

For the Bachelor's programmes Biology Education, Chemistry Education, and Science Education

- A 4. (ASIIN 1.3) Increase the number of didactical/educational modules.

Initial Treatment	
Peers	Fulfilled Vote: unanimous Justification: In the educational programmes, improvements were clearly included in the study plans.
TC 09	Fulfilled Vote: unanimous Justification: The TC follows the peers' assessment.
TC 10	Fulfilled Vote: unanimous Justification: The TC agrees with the peers' opinion.

For the Bachelor's degree programmes in Biology Education and Biology

- A 5. (ASIIN 4.3) Provide a concept for ensuring that practical courses are sufficiently equipped for the entire accreditation duration.

Initial Treatment	
Peers	Fulfilled Vote: unanimous

I Fulfillment of Requirements (24.03.2023)

	Justification: The number of microscopes in every laboratory has been increased. Besides microscopes, the university has also installed one new incubator shaker and one UV Vis Spectrophotometer. In addition, a timetable for purchasing new instruments is provided.
TC 09	Fulfilled Vote: unanimous Justification: The TC follows the peers' assessment.
TC 10	Fulfilled Vote: unanimous Justification: The TC agrees with the peers' opinion.

Decision of the Accreditation Commission (24.03.2023)

Degree Programme	ASIIN seal	Subject-specific labels	Maximum duration of accreditation
Ba Chemistry Education	All requirements fulfilled	-	30.09.2027
Ba Chemistry	All requirements fulfilled	-	30.09.2027
Ba Biology Education	All requirements fulfilled	-	30.09.2027
Ba Biology	All requirements fulfilled	-	30.09.2027
Ba Science Education	All requirements fulfilled	-	30.09.2027

Appendix: Programme Learning Outcomes and Curricula

According to [...] the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the Bachelor degree programme Biology Education:

Objectives:

1. Producing biology education graduates who are intelligent, religious, noble, independent, and able to develop themselves professionally.
2. Producing scientific and innovative works in the field of biology education in accordance with the results of research and development based on transformative learning principles and local potentials/wisdoms.
3. Producing community service work in the field of biology education and learning based on transformative learning principles and local potentials/wisdoms to support independent, productive and prosperous communities.

Learning outcomes:

1. Have knowledge and abilities to show behavior as religious citizen, respect Indonesian culture and Indonesian as nation based on Pancasila, and be independent in producing innovative and adaptive works based on global dynamics.
2. Have educational values and sciences, as well as theoretical and applicative learning within the Indonesian culture framework, in its role as a critical, innovative, adaptive, and communicative educators in accordance with the character and culture of students in the global era
3. Mastering basic scientific concepts and scientific procedures to find, analyze problems / phenomena in the field of science with a science and technology approach carried out carefully, critically, and systematically so that they can appreciate God's creation and preserve it.
4. Mastering the theoretical concepts and basic procedures of biology as well as managing an integrated laboratory using logical, critical, systematic thinking to develop innovative, creative, ICT-based, and local wisdom learning biology.

0 Appendix: Programme Learning Outcomes and Curricula

5. Mastering the basic concepts of biology learning design to design, implement, and evaluate student-centered and scientific-based biology learning by utilizing ICT, potential and local wisdom to develop 21st century life skills.

The following **curriculum** is presented:

No	SEMESTER I			SEMESTER II		
	COURSE	PASSWORD	CREDITS/JS	COURSE	PASSWORD	CREDITS/JS
1.	Civics Education	UNIVUM6007	2/2	Religion Education	UNIVUM600X	3/3
2.	Introduction to Education Sciences	UNIVUM6011	2/2	Learner Development	UNIVUM6012	3/3
3	Basics of Science	FMIAUM6001	2/2	Biochemistry	PBIOUM6107	2/4
4	General Biology	PBIOUM6101	2/2	Animal Structure and Development 1	PBIOUM6109	3/5
5.	English for Biology	PBIOUM6102	2/2	Plant Structure and Development 1	PBIOUM6110	3/5
6.	Physics for Biology	PBIOUM6103	2/4	Protists	PBIOUM6112	3/5
7.	Chemistry for Biology	PBIOUM6104	2/4	Research Methodology	PBIOUM6118	2/4
8.	Laboratory Technique	PBIOUM6106	2/4	Statistics	PBIOUM6105	2/2
9.	Cell Biology	PBIOUM6111	3/3			
	TOTAL NUMBER		19	TOTAL NUMBER		21
No	SEMESTER III			SEMESTER IV		
	COURSE	PASSWORD	CREDITS/JS	COURSE	PASSWORD	CREDITS/JS
1.	Indonesian for Academic Purposes	UNIVUM6009	2/2	Civics Education	UNIVUM6008	2/2
2.	Learning and Instructions	UNIVUM6013	3/3	Animal Diversity	PBIOUM6119	3/5
3.	Animal Structure and Development 2	PBIOUM6113	2/4	Plant Diversity	PBIOUM6120	3/5
4.	Plant Structure and Development 2	PBIOUM6114	2/4	Genetics 1	PBIOUM6121	3/5
5.	Plant Physiology	PBIOUM6115	3/5	Biology Instructional Strategies	PBIOUM6201	2/2
6.	Human Physiology	PBIOUM6117	3/5	Resources and Media Development in Biology Learning	PBIOUM6202	2/4
7.	Ecology	PBIOUM6123	3/5	Biology Learning Evaluation	PBIOUM6203	2/4
8.	Microbiology	PBIOUM6124	3/5	Biology Instructional Curriculum and Design	PBIOUM6204	3/5
	TOTAL NUMBER		21	TOTAL NUMBER		20

0 Appendix: Programme Learning Outcomes and Curricula

No	SEMESTER V			SEMESTER VI		
	COURSE	PASSWORD	CREDITS/JS	COURSE	PASSWORD	CREDITS/JS
1.	Innovation Management	UNIVUM6010	3/3	Evolution	PBIOUM6129	2/2
2.	Biology Edupreneur in Education	PBIOUM6131	2/2	Educational Research Methodology	PBIOUM6210	2/4
3.	Genetics 2	PBIOUM6122	2/4	Seminar on Biology Education	PBIOUM6211	1/3
4	Technobiology	PBIOUM6128	2/4	Specialization and Self-Development Courses	...	15-17/...
5.	Micro-teaching Practice in Biology	PBIOUM6205	3/5			
6.	Specialization and Self-Development Courses	...	9-11/...			
	TOTAL NUMBER		21-23	TOTAL NUMBER		20-22
No	SEMESTER VII			SEMESTER VIII		
	COURSE	PASSWORD	CREDITS/JS	COURSE	PASSWORD	CREDITS/JS
1.	Student Community Service	UKKNUM6090	4/12	Student Community Service	UKKNUM6090	(4/12)
2.	Teaching internship	UPLPUM6090	4/12	Teaching internship	UPLPUM6090	(4/12)
3.	Undergraduate Thesis	PBIOUM6100	(4/12)	Undergraduate Thesis	PBIOUM6100	4/12
4.	Specialization and Self-Development Courses	...	7-11			
	TOTAL NUMBER		15-23/...	TOTAL NUMBER		4-12/...

According to [...] the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the Bachelor degree programme Biology:

Objectives:

To produce biology graduates who are intelligent, religious, noble, independent, and able to develop professionally.

2. To produce excellent scientific and creative works in the field of biology.

3. To produce works of community service in the field of biology to create independent, productive, and prosperous society.

4. To produce quality, effective, efficient, transparent and accountable performance of biology study programs in the implementation of the threefold mission of higher education.

Learning Outcomes:

1. To have knowledge and abilities to show behavior as religious citizen, to respect Indonesian culture and Indonesian as nation based on Pancasila, and to be independent in producing innovative and adaptive works based on global dynamics

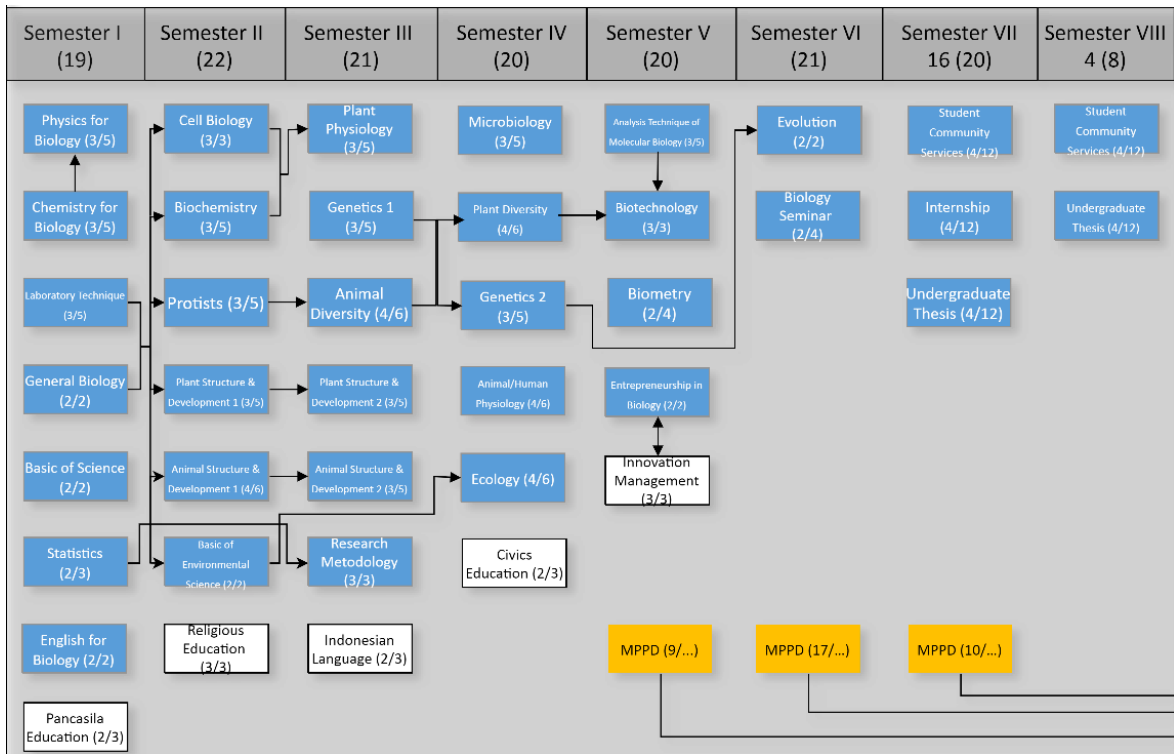
2. To master basic science concepts and scientific procedures to find, analyze problems/natural phenomena in the field of science, carried out carefully, critically, and systematically

3. To master basic biological theoretical concepts in an integrated manner using logical, critical, systematic and innovative thinking through a science and technology approach to analyze various problems in the field of biology

4. To implement basic biological concepts, principles and procedures to design investigations in an effort to solve problems in the health, food and environment using technology applications

The following **curriculum** is presented:

0 Appendix: Programme Learning Outcomes and Curricula



According to the study guidelines the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the Bachelor degree Chemistry Education:

Objectives:

To produce graduates of Chemistry Education Bachelor's Degree who are intelligent, religious, noble, independent, and can develop professionally;

1. To produce superior scientific and creative work in the Chemistry Education field.
2. To produce community service work in the Chemistry Education Work and the applied to manifest an independent, productive, and prosperous society.

Learning outcomes:

1. To have knowledge and ability to display behavior as religious citizens, love nation and
2. Indonesian culture based on the spirit of Pancasila and have independence in working innovatively and adaptively based on global dynamics.
3. To have insight of value and knowledge of education pedagogy and learning both in theory and application within the framework of Indonesian culture, in their role as a creative, innovative, adaptive educator and educational staff based on the character and culture of learner in the global era.
4. To master chemistry and scientific inquiry, as well as able to utilize them to explore and explain natural phenomena related to chemistry, therefore graduates realize how valuable the universe is and the importance to preserve nature.
5. To be able to design, implement, and evaluate chemistry learning in schools by paying attention to critical, creative, and innovative thinking aspects.
6. To be able to identify chemistry learning problems, find alternative solutions, present professional experiences, and their research findings become scientific works.
7. To be able to develop learning methods, media, and teaching materials based on the characteristics of students and subject matter by utilizing ICT developments as well as able to manage chemistry education in both formal and nonformal education.
8. To be able to manage and develop educational institutions by implementing collaborative and communicative skills to develop competency, career, and teamwork.

The following **curriculum** is presented:

SEMESTER I			
CHEMISTRY EDUCATION STUDY PROGRAM			
No.	Code	Course Name	Credit/H
1	UNIVUM6007	Pancasila Education	2/2
2	UNIVUM6011	Introduction to Education	2/2
3	PKIMUM6001	Mathematics for Chemistry	2/2
4	FMIAUM6001	Fundamentals of Science	2/2
5	PKIMUM6003	Biology for Chemistry	2/2
6	PKIMUM6004	Basic Chemistry I	4/4
7	PKIMUM6005	Basic Chemistry Practicum I	2/4
8	PKIMUM6201	Chemical Structure and Bond	3/3
9	PKIMUM6002	Physic for Chemistry	2/2
10			
Total credits			21

SEMESTER II			
CHEMISTRY EDUCATION STUDY PROGRAM			
No.	Code	Course Name	Credit/H
1	UNIVUM6001	Religion Education	3/3
2	UNIVUM6012	Learner Development	3/3
3	PKIMUM6006	Basic Chemistry II	4/4
4	PKIMUM6007	Basic Chemistry Practicum II	2/4
5	PKIMUM6202	Structures and Properties of Substance	3/3
6	PKIMUM6101	Gas and Chemical Thermodynamics	3/3
7	PKIMUM6301	Basic Concept of Organic Chemistry	3/3
8			
Total credits			21

SEMESTER III			
CHEMISTRY EDUCATION STUDY PROGRAM			
No.	Code	Course Name	Credit/H
1	UNIVUM6009	Indonesian Language Education	2/2
2	UNIVUM6013	Learning and Teaching	3/3
3	PKIMUM6401	Fundamentals of Analytical Chemistry	3/3
4	PKIMUM6302	Descriptive Organic Chemistry	3/3
5	PKIMUM6102	Phase Equilibrium and Chemical Equilibrium	3/3
6	PKIMUM6601	Chemistry Learning Strategy	3/3
7		Elective Course	4/4
Total credits			22

SEMESTER IV			
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0 Appendix: Programme Learning Outcomes and Curricula

CHEMISTRY EDUCATION STUDY PROGRAM			
No.	Code	Course Name	Credit/H
1	UNIVUM6010	Innovation Management	3/3
2	PKIMUM6402	Practicum for Fundamentals of Analytical Chemistry	2/4
3	PKIMUM6602	Chemistry Learning Evaluation	3/3
4	PKIMUM6204	Inorganic Chemistry Practicum	2/4
5	PKIMUM6403	Chemistry Separation and Instrumentation Analysis	3/3
6	PKIMUM6303	Phase Equilibrium and Chemical equilibrium	2/4
7	PKIMUM6103	Electrochemistry and Chemical Kinetics	3/3
8	PKIMUM6504	Biochemistry	3/3
9	UNIVUM6008	Civics Education	2/2
Total credits			23

SEMESTER V CHEMISTRY EDUCATION STUDY PROGRAM			
No.	Code	Course Name	Credit/H
1	PKIMUM6104	Practicum for Measuring Chemical and Physical Properties of Materials	2/4
2	PKIMUM6603	Education Statistics	2/2
3	PKIMUM6505	Biochemistry Practicum	2/4
4	PKIMUM6408	Chemical Environment	3/3
5	PKIMUM6618	Chemistry for Entrepreneur	2/4
6		Elective Course	11/-
Total credits			22

SEMESTER VI CHEMISTRY EDUCATION STUDY PROGRAM			
No.	Code	Course Name	Credit/H
1	PKIMUM6605	Chemistry Education Research Methodology	2/2
2	PKIMUM6609	Chemistry Education Seminar	2/4
3		Elective Course	18/-
Total credits			22

SEMESTER VII CHEMISTRY EDUCATION STUDY PROGRAM			
No.	Code	Course Name	Credit/H
1	UPLP6090	School Field Introduction	4/16
2	PKIMUM6100	Chemistry Education Bachelor's Thesis	4/-
3	UKKN6090	KKN	4/-
4		Elective Course	3/4
Total credits			15

SEMESTER VIII CHEMISTRY EDUCATION STUDY PROGRAM			
No.	Code	Course Name	Credit/H
1	PKIMUM6100	Chemistry Education Bachelor's Thesis	4/-
Total credits			4

Total Credits are 146 credits

According to [...] the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the Bachelor degree Chemistry:

Objectives:

1. To produce graduates who are intelligent, religious, noble, independent, and professionally developed in the Chemistry and Chemistry Education field.
2. To produce graduates with superior scientific and creative works in the Chemistry and Chemistry Education field.
3. To produce graduates community service works in the Chemistry, Chemistry Education field and its application to manifest an independent, productive, and welfare society.

Learning outcomes:

1. To master the scientific concepts and basic scientific procedures, to find, analyse problems and natural phenomena carefully and critically.
2. To master the basics, applications, and current developments in the fields of analytical chemistry, inorganic chemistry, organic chemistry, physical chemistry, and biochemistry.
3. To plan, carry out scientific experiments, obtain data and analyse results accurately.
4. To have problem solving skills, critical thinking, reasoning analytically to solve scientific problems, and communicating the results of scientific work orally, in writing both for the scientific community and the general public by paying attention to scientific ethics.
5. To be able to play a role in a team to solve interdisciplinary problems ethically and are aware that chemistry is an important aspect of solving problems in people's lives.
6. To possess knowledge and skills that exhibit the behaviour as a religious citizen who appreciates Indonesia's state, nation, and culture based on Pancasila's spirit and to possess independence in working in an innovative, adaptive, and critical manner to global dynamics.

The following **curriculum** is presented:

FIRST SEMESTER				
No.	Code	Course Name	Credits	ECTS
1	UNIVUM6007	Pancasila Education	2	3.17
2	FMIAUM6001	Science Foundations	2	3.17
3	NKIMUM6001	Mathematics for Chemistry	2	3.17
4	NKIMUM6002	Physic for Chemistry	2	3.17
5	NKIMUM6003	Basic Chemistry I	4	6.35
6	NKIMUM6004	Basic Chemistry Laboratory I	2	3.17
7	NKIMUM6007	Biology for Chemistry	2	3.17
8	NKIMUM6201	Structure and Chemical Bonding	3	4.76
9	NKIMUM6013	Introduction to Renewable Energy	2	3.17
		Total	21	33.32

Second Semester				
No.	Code	Course Name	Credits	ECTS
1	UNIVUM6001-6006, 6014	Education on Islam/ Catholicism/ Christianity/ Hinduism/ Buddhism/ Confucianism/ Spirituality	3	4.76
2	NKIMUM6005	Basic Chemistry II	4	6.35
3	NKIMUM6006	Basic Chemistry Laboratory II	2	3.17
4	NKIMUM6009	English for Chemistry	2	3.17
5	NKIMUM6101	Gas and Chemistry Thermodynamics	3	4.76
6	NKIMUM6202	Structure and Properties of Matter	2	3.17
7	NKIMUM6301	Fundamental of Organic Chemistry	3	4.76

0 Appendix: Programme Learning Outcomes and Curricula

8	NKIMUM6501	Microbiology	2	3.17
		Total	21	33.32

Third Semester				
No.	Code	Course Name	Credits	ECTS
1	UNIVUM6009	Indonesian for Academic Purposes	2	3.17
2	NKIMUM6102	Phase and Chemistry Equilibrium	3	4.76
3	NKIMUM6203	Descriptive Inorganic Chemistry	4	6.35
4	NKIMUM6204	Inorganic Chemistry Laboratory	2	3.17
5	NKIMUM6302	Descriptive Organic Chemistry	3	4.76
6	NKIMUM6401	Fundamental Analytical Chemistry	3	4.76
7	NKIMUM6402	Fundamental Analytical Chemistry Laboratory	2	3.17
8	NKIMUM6019	Chemical Entrepreneurship	2	3.17
9	NKIMUM6008	Statistics	2	3.17
		Total	23	36.49

Fourth Semester				
No.	Code	Course Name	Credits	ECTS
1	UNIVUM6008	Civics Education	2	3.17
2	NKIMUM6103	Electrochemistry and Kinetics	3	4.76
3	NKIMUM6104	Physico-Chemistry Properties Measurement Laboratory	3	4.76
4	NKIMUM6205	Physical Inorganic Chemistry	2	3.17
5	NKIMUM6303	Analysis and Identification of Organic Compounds Laboratory	2	3.17
6	NKIMUM6304	Polyfunctional and Biomolecule Compound	3	4.76
7	NKIMUM6403	Separation Chemistry	3	4.76
8	NKIMUM6405	Instrumentation Analysis	3	4.76
9	NKIMUM6XXX	1 Elective Course Specialization and Self-development Course	2	3.17
		Total	23	36.49

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Fifth Semester				
No.	Code	Course Name	Credits	ECTS
1	UNIVUM6010	Innovation Management	3	4.76
2	NKIMUM6105	Applied Physical Chemistry Laboratory	2	3.17
3	NKIMUM6106	Applied Thermodynamic	2	3.17
4	NKIMUM6206	Coordination Chemistry	2	3.17
5	NKIMUM6305	Synthesis and Isolation of Organic Compound Laboratory	2	3.17
6	NKIMUM6306	Physical Organic Chemistry	2	3.17
7	NKIMUM6404	Separation Chemistry Laboratory	2	3.17
8	NKIMUM6406	Instrumentation Analysis Laboratory	2	3.17
9	NKIMUM6502	Structure and Function of Biomolecule	3	4.76
10	NKIMUM6XXX	1 Elective Course Specialization and Self-development Course	2	3.17
		Total	22	34.9

Sixth Semester				
No.	Code	Course Name	Credits	ECTS
1	NKIMUM6010	Chemistry Research Methodology	2	3.17
2	NKIMUM6307	Organic Structure Elucidation	2	3.17
3	NKIMUM6408	Environmental Chemistry	3	4.76
4	NKIMUM6503	Biomolecule Metabolism	3	4.76
5	NKIMUM6505	Biochemistry Laboratory	2	3.17
6	NKIMUM6015	Chemistry in Daily Life	2	3.17
7	NKIMUM6XXX	1 Elective Course Specialization and Self-development Course	2	3.17
		Total	16	25.38

Seventh Semester				
No.	Code	Course Name	Credits	ECTS

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1	NKIMUM6090	Fieldwork Practice	4	7.28
2	UKKNUM6090	Student Community Engagement	4	7.28
3	NKIMUM6011	Chemistry Seminar	2	3.17
4	NKIMUM6407	Applied Instrumentation Analysis	2	3.17
5	NKIMUM6XXX	3 Elective Course MPPD-B. Specialization and Self-development Course	6	9.52
		Total	18	30.42

Eighth Semester				
No.	Code	Course Name	Credits	ECTS
1	NKIMUM6100	Chemistry Undergraduate Thesis	4	7.28
		Total	4	7.28

According to [...] the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the Bachelor degree programme Science Education:

Objectives:

1. Produce graduates of Education in Natural Sciences who are knowledgeable, intelligent, religious, noble, independent, and able to develop professionally and sustainably.
2. Produce scientific works and creative works that define and become a reference in the implementation of Natural Sciences education.

Learning outcomes:

1. Have knowledge and ability to behave as citizens who are religious, love the country, the nation and the culture of Indonesia based on the soul of Pancasila and have independence in working innovatively, adaptively, and critically in accordance with the global dynamics.
2. Have value and scientific knowledge of Education and learning theoretically and in applicative manner in the framework of Indonesian culture, in their role as educators and education staff who are critical, innovative, adaptive, and communicative in accordance with the character and culture of the learners in the global era.
3. Able to master the science of basic biology with the use of nature of science (NOS) as a provision for the ability of designing learning of Natural Sciences Education for Junior High School which is innovative and productive by utilizing the potential of the local environment and the development of IT
4. Able to master the science of basic Physics and Earth and Space Sciences (IPBA) with the use of nature of science (NOS) as a provision for the ability of designing learning
5. of Natural Sciences Education for Junior High School which is innovative and productive by utilizing the potential of the local environment and the development of IT
6. Able to master the science of basic Chemistry with the use of nature of science (NOS) as a provision for the ability of designing learning of Natural Sciences Education for Junior High School which is innovative and productive by utilizing the potential of the local environment and the development of IT
7. Able to analyze the phenomenon of science in an integrated way to solve problems with critical thinking and utilize IT as data source
8. Master the tools for mastering Natural Sciences (mathematics, languages, computing) and in a creative and innovative way and apply them to support the mastery of science and Natural Sciences learning

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9. Master the of psychology of development and learning theories for designing, implementing, and evaluating Natural Sciences learning which is an innovative, productive, and oriented on the development of the student capability, as well as able to adapt to changes in curriculum, technology and the environment by upholding social sensitivity, diversity of cultures, views and religion.
10. Able to analyze problems in Natural Sciences learning and mastering the diagnosis techniques of learning, methods and data analysis by utilizing IT in the research on the field of Natural Sciences Learning and communicate the results in accordance with scientific principles with transdisciplinary approach
11. Able to master the concepts and principles of management (school, laboratory of Natural Sciences for Junior High School, learning resources) to develop innovative learning, as well as develop edutainmentpreneurship of Learning Props/Software that is innovative and adaptive to technological developments and the needs of the community independently

The following **curriculum** is presented:

SEMESTER I				SEMESTER II			
No.	Code	Courses	Credits/ H	No.	Code	Courses	Credits/ H
01	UNIVUM6007	<i>Pancasila</i> Education	2/2	01	UNIVUM6001	Islamic Education	3/3
02	UNIVUM6011	Introduction to Education	2/2			Protestant Education	3/3
03	PIPAUM6101	Basic Biology I	4/4			Catholic Education	3/3
04	PIPAUM6201	Basic Chemistry I	4/4			Hindu Education	3/3
05	PIPAUM6301	Basic Chemistry I	4/4			Buddhist Education	3/3
06	PIPAUM6502	Mathematics for Natural Sciences	2/2			Spiritual Education	3/3
07	PIPAUM6501	Option 1 English for Natural Sciences	2/2	02	UNIVUM6012	Learner Development	3/3
08	PIPAUM6503	Option 2 Information and Communication Technology	2/2	03	FMAUM6001	Science Basis	2/2
				04	PIPAUM6102	Basic Biology II	4/4
				05	PIPAUM6202	Basic Physics II	4/4
				06	PIPAUM6302	Basic Chemistry II	4/4
				07	PIPAUM6801	Option 3 Laboratory Management	2/2

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SEMESTER I				SEMESTER II			
No.	Code	Courses	Credits/ H	No.	Code	Courses	Credits/ H
Total credits			22	Total credits			22

SEMESTER III				SEMESTER IV			
No.	Code	Courses	Credits/ H	No.	Code	Courses	Credits/ H
01	UNIVUM6009	Indonesian Language Education	2/2	01	UNIVUM6008	Civics Education	2/2
02	UNIVUM6013	Learning and Teaching	3/3	02	PIPAUM6205	Wave and Optics	4/4
03	PIPAUM6203	Mechanics and Electromagnetism	4/4	03	PIPAUM6401	Natural Sciences Learning Strategy	2/2
04	PIPAUM6204	Earth Science	3/3	04	PIPAUM6402	Natural Sciences Education Assessment	2/2
05	PIPAUM6601	Biochemistry	3/3	05	PIPAUM6602	Physical Chemistry	3/3
06	PIPAUM6303	Option 4 Environmental Chemistry	3/3	06	PIPAUM6103	Option 7 Genetics and Evolution	2/2
07	PIPAUM6605	Option 5 Additive and Addictive Substances	2/2	07	PIPAUM6206	Option 8 Astronomy	2/2
08	PIPAUM6610	Option 6 Disaster Management	2/2	08	PIPAUM6702	Option 9 Development of Natural Sciences Learning Media	3/3
Total credits			22	Total credits			20

SEMESTER V				SEMESTER VI			
No.	Code	Courses	Credits/ H	No.	Code	Courses	Credits/ H
01	UNIVUM6010	Innovation Management	3/3	01	PIPAUM6407	Research Methodology for Natural Sciences Education	2/2
02	PIPAUM6104	Biodiversity	4/4	02	PIPAUM6105	Ecology	4/4
03	PIPAUM6403	Educational Research Statistics	2/2	03	PIPAUM6606	Natural Sciences for School	2/2
04	PIPAUM6404	Curriculum and Design of Integrated Natural Sciences Learning	3/3	04	PIPAUM6408	Micro Practice of Integrated Natural Sciences Learning	3/3
05	PIPAUM6603	Biophysical	2/2	05	PIPAUM6701	Entrepreneurship	2/2
06	PIPAUM6406	Development of Natural Sciences Learning Source and Media	3/3	06	PIPAUM6703	Option 12 Development of Natural Sciences Learning Digital Media	3/3
07	PIPAUM6405	Option 10 Science, Technology, Engineering, and Mathematics	3/3	07	PIPAUM6611	Option 13 Oceanography	2/2

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SEMESTER V				SEMESTER VI			
No.	Code	Courses	Credits/ H	No.	Code	Courses	Credits/ H
08	PIPAUM6604	Option 11 Applied Natural Sciences	3/3	08	PIPAUM6802	Option 14 School Management	2/2
				09	PIPAUM6410	Option 15 Assessment Instrument Development	3/3
Total credits			23	Total credits			23

SEMESTER VII				SEMESTER VIII			
No.	Code	Courses	Credits/ H	No.	Code	Courses	Credits/ H
01	UPLPUM6090	School Field Introduction	4/16	01	PIPAUM6100	Bachelor's Thesis	4/16
02	PIPAUM6409	Natural Sciences Education Seminar	2/2	02	UKKNUM6090	Community Service Program	4/680
Total credits			6	Total credits			8