ASIIN Seal

Accreditation Report

Bachelor's Degree Programmes
Mathematics
Mathematics Education
Physics
Physics Education

Provided by
Universitas Negeri Malang

Version: 23 September 2022

Table of Content

A About the Accreditation Process

Name of the degree programme (in original language)	(Official) English translation of the name	Labels applied for [1]	Previous accreditation (issuing agency, validity)	Involved Technical Committees (TC)[2]
S 1 Matematika	Bachelor of Mathematics	ASIIN	--	12
S 1 Pendidikan Matematika	Bachelor of Mathematics Education	ASIIN	--	12
S 1 Fisika	Bachelor of Physics	ASIIN	--	13
S 1 Pendidikan Fisika	Bachelor of Physics Education	ASIIN	--	13
Date of the contract: 21.12.2020 **Submission of the final version of the self-assessment report:** 25.05.2021 **Date of the onsite visit:** 28.-30.06.2021 **Via video conference**				
Peer panel: Prof. Dr. Martin Buhmann, Giessen University Dr. Angela Fösel, University of Erlangen-Nuernberg Prof. Dr. Thomas Trefzger, University of Wuerzburg Alexandra Dreiseidler, prev. Emil-Fischer-Gymnasium Euskirchen Luthfia Hastifa, student at Universitas Hasanuddin				
Representative of the ASIIN headquarter: Jan Philipp Engelmann				

[1] ASIIN Seal for degree programmes.
[2] TC: Technical Committee for the following subject areas: TC 12 - Mathematics; TC 13 - Physics.

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 12 – Mathematics as of December 9, 2016 Subject-Specific Criteria of Technical Committee 13 – Physics as of March 20, 2020	

B Characteristics of the Degree Programmes

a) Name	Final degree (original/English translation)	b) Areas of Specialization	c) Corresponding level of the EQF[3]	d) Mode of Study	e) Double/Joint Degree	f) Duration	g) Credit points/unit	h) Intake rhythm & First time of offer
S1 Matematika Mathematics	S.Si B. Sc.	--	6	Full time	--	8 semesters	146 SKS (≈234.45 ECTS)	Yearly in July 1997
S1 Pendidikan Matematika Mathematics Education	S.Pd B. A.	--	6	Full time	--	8 semesters	146 SKS (≈234.45 ECTS)	Yearly in July 1996
S1 Fisika Physics	S.Si B. Sc.	--	6	Full time	--	8 semesters	146 SKS (≈234.92 ECTS)	Yearly in July 1997
S1 Pendidikan Fisika Physics Education	S.Pd B. A.	--	6	Full time	--	8 semesters	146 SKS (≈234.92 ECTS)	Yearly in July 1996

For the Bachelor's degree programme Mathematics the institution has presented the following profile on their website:

"**Vision**

The scientific vision of Bachelor of Mathematics FMIPA UM is developing the study of mathematics that is adaptive to the development of Science and Technology (IPTEKS) by implementing innovative learning models based on ICT (Information and Communication Technology) to produce graduates who have characteristics of problem-solver, competitive, adaptive, and flexible to life challenges (industrial challenges/challenges of time).

Mission

1. To provide student-centered education and learning in the field of mathematics by using effective research-based learning approach, and optimizing information and technology device.
2. To promote research in the field of mathematics and its application for the development of knowledge¬ and the welfare of the community.

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

3. To conduct community service in the field mathematics implementation and its application towards the empowerment of the community.

Degree Program Objectives

1. To produce quality mathematics graduates and to produce quality academic works in mathematics field.
2. To produce researches in mathematics and its application that are useful for the science development and community.
3. To produce community services by applying mathematics and its application which are oriented on community empowerment.

Graduate Profile

Mathematics graduates that are capable to design, implement, and report researches regarding the field of Mathematics, and have the characteristic of problem solver, competitive, adaptive, and flexible to the challenges in life in the framework of scientific behavior based on science and technology development and Pancasila values. The profile above is described as follows, the graduates of the Bachelor of Mathematics FMIPA UM are bachelor of mathematics who are:

1. capable to design, implement, and report researches in the fields of analysis, algebra, modeling, applied mathematics, and its application in various fields, as well as disseminate it by prioritizing honesty, transparency, and accountability;
2. capable to analyze problems, formulate algorithm, and implement it in the form of software and disseminate it by prioritizing innovation, accuracy, efficiency, and effectivity;
3. capable to manage, analyze, and interpret data by applying the technology, then produce statistical data, its indicators, and disseminate it by prioritizing accuracy and precision;
4. possessing entrepreneurship based on Pancasila values."

For the Bachelor's degree programme Mathematics Education the institution has presented the following profile on their website:

"Vision

The Scientific Vision of Mathematics Study that will be achieved in 2030 are as follow: to develop sciences by emphasizing mathematics learning innovation, develop mathematics learning media, develop the professionalism of mathematics teachers, and develop contin-

uous mathematics education studies to produce graduates with the ability to teach, develop mathematics learning media, and adaptive toward the science and technology development.

Mission

1. To conduct student-centered mathematics education and teaching-learning by applying effective learning approaches, and optimize technology usage.
2. To carry out mathematics education studies that are useful for science development and community welfare.
3. To serve the community by applying community-empowerment-oriented mathematics and mathematics education.

Degree Program Objectives

1. To produce mathematics education graduates with student-centered mathematics learning by applying effective learning approaches, and optimize technology usage.
2. To produce quality academic works in the field of mathematics education through mathematics education researches that are useful for science development and community welfare.
3. To produce community service by applying mathematics and mathematics education which are oriented on community empowerment in the form of scientifical information service, the implementation of researches' results, training, workshops, skill education programs, continuous education programs, enhancing the role of alumnae as a partner to develop the Degree Program of the Bachelor of Mathematics FMIPA UM.

Graduate Profile

Mathematics education graduates that are capable in mastering mathematical concepts, teaching in mathematics, creating and developing mathematics learning media, and conducting mathematics education researches by adapting to technology and social culture development, also, having the personality of entrepreneurship based on Pancasila values."

For the Bachelor's degree programme Physics the institution has presented the following profile on their website:

"VISION

PS S1 Physics's vision is to become an excellent study program and a reference in the science, research and application of physics.

MISSION

The PS S1 Physics mission is as follows.

1. Organizing student-centered physics education and learning, using an effective learning approach, and optimizing the use of technology.
2. Conducting research in the field of physics that is beneficial for the development of science and the welfare of society.
3. Organizing community service through the application of physics oriented to community empowerment.
4. Organizing an autonomous, accountable and transparent meeting that ensures the continuous improvement of the quality of the Physics Study Program

DESTINATION

1. Produce graduates who are knowledgeable, religious, noble, independent, and able to develop professionally in the field of physics.
2. Produce superior scientific and creative works in the field of physics.
3. Produce community service work in the field of physics to create an independent, productive, and prosperous society.

GRADUATE PROFILE

Bachelor of Physics who is innovative, adaptive, independent, and has the ability to apply science and physics methodologies in the fields of material physics, optoelectronics, geophysics and astronomy, and has the ability to disseminate the results of his studies by utilizing ICT in order to have high acceptability and flexibility in the era of global competition."

For the Bachelor's degree programme Physics Education the institution has presented the following profile on their website:

"VISION

The vision of the Physics Education Study Program is as follows. Physics Education Undergraduate Program as an excellent study program and a reference in the implementation of the tridharma of higher education in the field of physics education and learning. This vision is expected to be achieved in 2034 through the achievement of performance indicators in each of the five-year period of the FMIPA UM strategic plan.

Physics Education PS is expected to develop into a superior study program and a reference at the national level. Excellence and references in the development of physics education and learning are indicated by the following points. (1) Research and community service have been carried out by lecturers and the academic community of the Physics Education

Study Program. (2) The increasing number of innovative works and publications of lecturers/students in the field of physics education that can be referred to and utilized by the public. (3) More and more UM Physics Education PS lecturers are used as resource persons by the community. (4) The increasing number of requests for cooperation from other institutions.

MISSION

The mission of the Physics Education Study Program is as follows.

1. Organizing student-centered physics education and learning, using an effective learning approach, and optimizing the use of technology.
2. Conducting research in the field of physics education that is beneficial for the application of science and the welfare of society.
3. Organizing community service in the field of physics learning through the application of physics education that is oriented to community empowerment through the application of physics learning, physics, and technology.
4. Organizing an autonomous, accountable and transparent meeting that ensures continuous quality improvement.

DESTINATION

Each PS Education Physics mission has a goal, which is indicated by the same number of missions and objectives. This shows the relationship between the objectives and mission of the Physics Education Study Program. The objectives of the Physics Education Study Program are as follows.

Produce Physics Education Bachelors who are intelligent, religious, noble, independent, mastering physics material, learning and learning theory, student development, and physics learning strategies and evaluations, and able to develop professionally.

1. Produce superior scientific and creative works in the field of physics education.
2. Produce community service work in the field of physics education to create an independent, productive, and prosperous society.
3. Produce an effective, efficient and accountable performance of the Physics Education Study Program in the implementation of the tri dharma of higher education.”

C Peer Report for the ASIIN Seal

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 of the degree programmes
- Module descriptions
- Website
- Discussions during the 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 four Bachelor's degree programmes under review. They refer to the Subject-Specific Criteria (SSC) of the Technical Committees Mathematics (12) and Physics (13) as a basis for judging whether the intended learning outcomes of the degree programmes as defined by Universitas Negeri Malang correspond with the competences outlined by the SSC.

The university has described and published objectives, graduate profiles and learning outcomes for each of the four degree programmes. While the objectives are developed based on the vision and mission of the university as well as the faculty of Mathematics and Natural Sciences and are rather general and concise, the learning outcomes describe the competences, which the students should acquire during their studies, in detail. By means of being published on the websites of the degree programmes both in Bahasa Indonesia and in English, the objectives, graduate profiles and learning outcomes are well-anchored, binding, and easily accessible for all stakeholders.

The learning outcomes of all programmes contain the general aspect that graduates should be able to think independently and critically and should behave in accordance with the

Indonesian constitutional principles of Pancasila. Beyond that, they encompass specific competences for each of the four programmes.

From the documents presented and the discussions with the representatives of Universitas Negeri Malang, the peers understand that graduates of the Mathematics programme are supposed to be capable of conducting research and applying mathematical methods in the fields of analysis, algebra, modelling and applied mathematics. Moreover, they should be able to formulate algorithms for problem-solving, to analyse and interpret statistical data and they should have internalised basic principles of entrepreneurship. The graduates of the Mathematics Education programme should have mastered the basic concepts of mathematics and be able to apply knowledge about didactics in creating teaching and learning materials as well as in designing and conducting teaching in mathematics. Furthermore, they should be able to engage in research on problems of mathematics education.

The university wants graduates of the Bachelor's degree programme Physics to understand the theoretical concepts and basic principles of classical and modern physics in order to apply this knowledge to the solution of physical problems. For this purpose, they should also be able to utilise their knowledge in mathematics and neighbouring natural sciences. Moreover, they should be able to develop research in physics and to communicate findings adequately. Besides competences in the application of physical concepts and methods, graduates in the Physics Education programme should be able to design, implement and assess physics learning processes, to develop adequate teaching and learning materials and to carry out research in this field (see the detailed objectives and learning outcomes in the appendix).

In the peers' opinion, the objectives and learning outcomes of all degree programmes are well written and cover all aspects that can be expected from a programme in the respective field. However, they think that besides algebra and analysis, probability theory could be mentioned explicitly in the graduate profile of the Mathematics programme as an important field of mathematics and as a basis for statistical analysis, which is taught in several modules of the programme. Moreover, they wonder what exactly the university means by the ability to conduct research, which is included as a learning outcome in all programmes, although in different wordings. In the discussions, they learn that this is not supposed to imply the kind of innovative research in new areas that graduates of Master's degree programmes should typically be able to conduct. As the peers understand it, it rather refers to the independent application of established knowledge and methods to new questions within the respective discipline, which they consider a valuable objective in its own right. As the learning outcomes and graduate profiles of the programmes do not distinguish between different kinds of research explicitly and are thus not easily intelligible in this regard, the peers would appreciate if the university could clarify this aspect in the documents.

Students and alumni confirm during the audit that they have good and diverse job opportunities either as teachers, researchers or in various positions in private companies and administration. They emphasise that the critical thinking and analytical problem-solving skills they acquire in the programmes allow them to also find jobs that are not directly related to their major. In general, the alumni are satisfied with their job perspectives and the peers appreciate the broad range of career opportunities, which is also confirmed by the representatives of schools and the private sector during the audit discussion.

In summary, the auditors are convinced that the intended qualification profiles of the four undergraduate programmes under review allow students to take up an occupation, which corresponds to their qualification. The peers agree that the qualification objectives of all 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 12 and 13, respectively. They aim at the acquisition of subject-specific competences and are generally formulated clearly and precisely.

The peers appreciate that a regular revision process for the objectives, learning outcomes and curricula of the programmes is in place. Every five years, a larger revision takes place that includes internal as well as external stakeholders, while minor changes are made regularly. The students, alumni and representatives of schools and the private sector confirm that they are actively involved in these processes.

Criterion 1.2 Name of the degree programme

Evidence:

- Self-Assessment Report
- Diploma Supplements

Preliminary assessment and analysis of the peers:
The titles of the degree programmes follow the rules for naming study programmes set by the Indonesian Ministry of Education. The abbreviation "S1" indicates undergraduate programmes, the word "Pendidikan" signifies educational degree programmes. The peers agree that the names of all four degree programmes adequately reflect their intended aims and learning outcomes.

Criterion 1.3 Curriculum

Evidence:

- Study plans of the degree programmes
- Module descriptions
- Objective-module matrices
- Website
- Discussions during the audit

Preliminary assessment and analysis of the peers:
The curricula of the degree programmes are designed to comply with the programme objectives and learning outcomes and they are subject to constant revision processes (cf. chapter 1.1). As such, the curricula are reviewed regularly and commented on by students and teachers as well as by external stakeholders such as alumni or partners from schools and the private sector. Regular changes are made to ensure that the curricula are up to modern standards. Besides the objectives and learning outcomes defined by Universitas Negeri Malang itself, the curricula also take into account the Indonesian standards of higher education and the Indonesian national qualifications framework as well as the recommendations from professional organisations in the fields of physics and mathematics, namely the Indonesian Mathematical Society and the Physical Society of Indonesia.

The courses in all degree programmes fall into three different categories: basic courses for character development, courses on subject matter and expertise as well as elective courses. The ratio between these categories is the same in all four programmes: They feature 12 Indonesian Credits (SKS, see chapter 2.2 for more details) of basic courses for character development, 36 SKS of elective courses and 98 SKS of mandatory courses on subject matter and expertise. Of the latter, a teaching internship (for the education programmes) or field work practice (for the other programmes) make up 4 SKS, the mandatory community service another 4 SKS. The peers learn that the students are quite satisfied with the ratio between the different types of courses, as they can acquire broad knowledge and choose their own focus through the choice of elective modules. They also value the impact of the general courses on their character formation and on the acquirement of soft skills.

In the Mathematics programme, the first five semesters are mostly filled with basic courses for character development and mandatory courses on subject matter and expertise. In these, the students learn the necessary basics in the different areas of mathematics, for instance algebra, calculus, geometry and probability. They also acquire competences in programming. The elective courses, through which the students can gain further insights in some of these areas, are spread out over semesters 5 to 8. The sixth semester also contains

the mandatory community service; the seventh contains the fieldwork practice. The students begin to prepare for their thesis in the sixth semester with the course on thesis proposal and write it in the seventh semester.

The Mathematics Education programme has a very similar structure. The major difference is that it contains a considerable number of courses dealing with pedagogical and didactic questions in a theoretical as well as a practical way – besides the courses in the mentioned areas of mathematics. In courses such as "Mathematics Learning Materials", "Practice on Micro Instruction of School Mathematics" and "Management of Mathematics Classroom", students obtain the necessary competences to become successful mathematics educators. Instead of the fieldwork practice, the seventh semester features a teaching internship, in which the students can apply this knowledge in a real school environment. Usually, the students are required to teach at school twice a week over the entire course of the semester.

The students of the Physics programme get an overview of basic science, mathematics and fundamentals of physics needed for their studies in the first two semesters. Over the course of the first six semesters, they take mandatory courses in the different areas of physics, such as mechanics, electronics, computational physics, optics and atomic physics. Besides the theoretical classes, they also acquire practical competences through experimental courses in various areas. Moreover, in semesters 4 to 7, the students can choose from a wide range of electives covering advanced and specialised fields of physics. The mandatory elements of fieldwork practice and community service are located in the seventh semester. The students prepare their undergraduate thesis, which is written in the final semester, through the module "Physics Seminar" in semester 6 by drafting a topic and handing in a proposal.

The Physics Education programme is based on a similar structure and includes many of the mentioned courses. Additionally, the students acquire didactic competences, for instance in designing classes, learning processes and learning media. In contrast to the Physics programme, most of the electives also deal with these issues. In semester 7, the students conduct a teaching internship as mentioned for the Mathematics Education programme. The "Seminar on Physics Education" in the sixth semester prepares the students for their thesis, on which they work in the final semester.

Overall, the peers are very satisfied with the curricula of all programmes. They see that the programmes are well structured and that the modules build on each other in a reasonable way, enabling the students to effectively reach the learning outcomes as laid down for the programmes as a whole. The peers particularly praise the high ratio of practical courses, be

it regarding experiments in the Physics programmes or regarding practical teaching exercises in the education programmes. As the students confirm, they feel well prepared for the challenges of the labour market, especially through these practical elements. The peers learn that while the teaching internships typically stretch over the entire courses of the semester, in which the students give classes twice a week, the fieldwork practice in companies usually takes 4 to 6 weeks. Both are highly valued by the students as they allow them to apply the skills they learned in the programmes in a real working environment. The university has established useful guidelines for these internships and every student has one advisor at the school/company and one at the university to ensure that the work contributes to achieving the programme's learning outcomes. The representatives of schools and the private sector are also generally content with the way these internships are organised by Universitas Negeri Malang. Regarding the education programmes, they would only recommend to strengthen the university's cooperation with private education organisations as an alternative career path for the students besides the public schools.

The peers discuss with the university the ways in which the students can improve their English proficiency. They learn that in both Physics programmes, there are courses to familiarise the students with the subject-specific English vocabulary and expressions. In the education programmes, the students can also take courses on teaching in English. Furthermore, English literature is widely used as can be seen from the literature suggested for the individual modules. In the Mathematics programme, there is also a special bilingual class, in which many of the modules are taught in English. Students can be admitted into this class based on their score in an English test held at the beginning of every semester. The peers are quite satisfied with these efforts.

The only aspect, where the peers detect significant room for improvement, is the presentation of the learning outcomes of the individual modules in the module handbooks. They see that these do not always refer to the skills that the students should acquire, but in some cases only to the knowledge that they gain. Therefore, they ask the university to revise the learning outcomes of the respective modules to clearly point out the skills and competences, which the students acquire.

Criterion 1.4 Admission requirements

Evidence:

- Self-Assessment Report
- Website

- Discussions during the audit

Preliminary assessment and analysis of the peers:
There are three different paths of admission into the programmes:

1. National Selection of Higher Education or University (Seleksi Nasional Masuk Perguruan Tinggi Negeri, SNMPTN), a national admission system, which is based on the academic performance during high school.

2. Joint Selection of Higher Education or University (Seleksi Bersama Masuk Perguruan Tinggi Negeri, SBMPTN). This national selection test is held every year for university candidates. It is a nationwide written test (subjects: mathematics, Bahasa Indonesia, English, physics, chemistry, biology, economics, history, sociology, and geography).

3. Independent Selection (Seleksi Penerimaan Mahasiswa Baru, SPMB): Students are selected based on a written test (similar to SBMPTN) specifically held by Universitas Negeri Malang for prospective students that haven not been accepted through SNMPTN or SBMPTN.

For each academic year, the university determines the ratio of students admitted through these three ways. Generally, the number of applications is considerably higher than the number of admitted students. For the academic year 2020/21, the ratio is between 1:2.6 for the Physics programme and 1:6.9 for the Mathematics Education programme.

The tuition fees for the programmes are determined by the Ministry of Finance based on a proposal from Universitas Negeri Malang. In the Faculty of Mathematics and Natural Sciences, there are seven levels for these fees, depending on the parents' income. For students from underprivileged families, there is no tuition fee. Furthermore, there are various options for scholarships that cover the tuition fees.

The admission website informs potential students in great detail 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 university'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 for providing additional information on the addressed issues. They understand that for the university, probability theory is implicitly included in graduate profile number 3 of the Mathematics programme ("able to manage, analyze and interpret data"). The peers follow this explanation and consider the learning outcomes of the programme to be adequate.

The university explains, that the kind of research, which graduates of the programmes are able to conduct, mainly refers to applying the findings of prior research. However, the peers still think this could be worded more clearly in the learning outcomes, so that the difference to the learning outcomes of Master's or doctoral degree programmes is more distinct.

The peers appreciate that Universitas Negeri Malang will revise the module handbooks to ensure that the learning outcomes for the individual modules consequently refer to skills.

They consider criterion 1 mostly fulfilled.

2. The degree programme: structures, methods and implementation

Criterion 2.1 Structure and modules

Evidence:

- Self-Assessment Report
- Study plans of the degree programmes
- Module descriptions
- Objective-Modules-Matrices
- Discussions during the audit

Preliminary assessment and analysis of the peers:
The programmes under review are designed for 4 years and the students need to achieve 146 CPs (which is roughly equivalent to 234 ECTS). Each semester is equivalent to 16 weeks of learning activities, including one week for midterm exams and one week for final exams.

After analysing the module descriptions and the study plans, the peers confirm that all degree programmes under review are divided into modules and that each module is a sum of coherent teaching and learning units. All 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). The peers notice that many modules are quite small in terms of credit points and they worry that this might lead to a very high number of exams per semester and consequently to a heavy workload for the students. They learn that this is to some extent countered by the fact that the length of the exams is proportionate to the amount of credit points for the module. The students also emphasise that they consider the workload high but manageable. As the data in the Self-Assessment Report shows, the

average length of study is only slightly more than eight semesters and the dropout rates are generally quite low. This indicates that the module structure allows the students to finish their studies in time. Therefore, the peers do not see an urgent problem in this module structure, but they advise the university to keep an eye on this matter (see chapters 2.2 and 3 for more details on the workload). The university could consider creating larger modules in the next curriculum revisions in order to keep the student workload and the number of exams per semester manageable.

In summary, the peers gain the impression that the choice of modules and the structure of the curriculum ensures that the intended learning outcomes of the respective degree programme can be achieved. However, the module descriptions are not always clear regarding the mandatory and recommended prerequisites for taking certain modules. As the peers learn in the discussions, there appear to be mandatory prerequisites in many cases to ensure that the students have acquired the necessary knowledge and skills. They normally do not show up in the module descriptions, however, making it unnecessarily difficult for students to plan their courses. Therefore, they ask Universitas Negeri Malang to clarify this in the module handbooks.

International Mobility

The Self-Assessment Report as well as the discussions make it very clear that international recognition is one of Universitas Negeri Malang's primary goals for the next years. The peers point out that international mobility, with regard to the lecturers as well as to the students, is a key factor in these efforts.

The peers learn that the university already provides some opportunities for students to conduct internships and study semesters abroad. There are cooperation agreements with organisations in 33 countries worldwide, partly regarding student exchange, partly regarding research collaboration. 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. 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 peers appreciate the efforts undertaken by the university to foster student mobility. They remark, however, that the effective amount of mobility to other higher education institutions in Indonesia or abroad is still relatively low. Furthermore, many of the stays abroad are quite short and most of them are restricted to South-East Asia. The peers emphasise that it is very useful for students to spend some time abroad already during their Bachelor's studies to improve their English proficiency, to get to know other educational systems, and to enhance their job opportunities. As they detect no problems concerning the organisation of student mobility and credit transfer, they suspect that a widening of the opportunities for the students and a focused advertisement may be helpful.

Criterion 2.2 Work load and credits

Evidence:

- Self-Assessment Report
- Study plans of the degree programmes
- Module descriptions
- Discussions during the audit

Preliminary assessment and analysis of the peers:
Based on the National Standards for Higher Education of Indonesia (SNPT), all four degree programmes under review use a credit point system called SKS. According to the legal requirements, an undergraduate programme in Indonesia can have between 144 and 160 SKS, while the actual number of the programmes under review is 146 SKS.

1 SKS of academic load is equivalent to 170 minutes per semester week. For lectures, tutorials and similar classes, this means 50 minutes of face-to-face activity, 60 minutes of structured tasks and 60 minutes of independent learning per semester week, whereas for seminars and similar forms of learning, it is 100 minutes face-to-face activity and 70 minutes of independent learning. For laboratory work, internships, community service etc., 1 SKS equals 170 minutes of the respective activity per semester week. The details and the students' total workload are described in the respective module descriptions. The peers acknowledge that a credit point system based on the students' workload is in place.

As the university explains, the conversion of SKS into ECTS depends on the type of activity. For theory and practice courses, the ratio is supposedly 1:1.59, whereas for internship and community service it is 1:1.82. The peers point out that, given that 1 SKS equals 170 minutes per semester week regardless of the activity, this cannot be true. The difference

may be due to the fact that mid-term and final exam are not included for the university courses. However, as mandatory parts of the modules, they should be included and as a result, there should be a single conversion rate between SKS and ECTS. The peers ask the university to apply this conversion rate uniformly in all module handbooks to correct the noted inconsistencies.

With the exception of the last two semesters, the workload is spread relatively evenly with each semester containing between 16 and 23 SKS according to the regular study plan. The workload of the last two (Mathematics Education, Physics Education) or the last (Mathematics, Physics) semester is markedly reduced to give the students enough time for their theses as well as to already start looking for a job. However, the effective number of SKS the students can take depends on their achievements in the previous semester. If their Grade Point Average is less than 2.0, they can take up to 16, between 2.0 and 3.0 up to 20 and above 3.0 up to 24 SKS in one semester. This mechanism is supposed to ensure that the students can really handle the workload. It also means that theoretically, students can finish their studies in less than 8 semesters, but due to the high workload in general, this is a rather rare phenomenon. 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 manage to finish their studies on time. Moreover, the dropout rates are very low in general, with the exception of a sudden peak in 2019 that is due to a change in government regulations regarding dropouts. Therefore, the peers conclude that the general workload is high but manageable, as the students confirm. However, some students also remarked that the workload can be difficult to handle at some points during their studies. 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. Consequently, they recommend that the university establish a systematic monitoring of the student workload for the individual modules, for example within the existing course evaluations.

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 handbook. Through the Indonesian regulations on credit points (see chapter 2.2), an adequate balance between face-to-face activities and independent learning is ensured for all courses. In the programmes under review, various student-centred learning methods are utilised. Besides the regular lectures, cooperative learning, project- and problem-based learning, inquiry and experiments (in physics) are used to a considerable degree. The students confirm that these methods are actually used in the courses and that they are highly satisfied with the variety of teaching methods, which support them in achieving the learning outcomes. The teaching and learning is supported by a broad range of media, both traditional (books, papers) and online (videos, presentations etc.). The university's online learning management system supports teachers and students in communicating and disseminating learning material. In the course of the Covid-19 pandemic, the university has swiftly switched to online learning with videoconferences, recorded videos and other media.

The peers consider the teaching methodologies employed in the degree programmes to be diverse and to support reaching the PEOs and PLOs. They are well adapted to the aims and conditions of the individual courses.

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 through various means. The main contact person for every student is their academic advisor, which is assigned to them in their first semester. An academic advisor shall help them develop an adequate schedule for their studies, choose electives according to their skills and interests and support them in case of academic and non-academic problems. Each student has the opportunity to meet with their academic advisor, who is also responsible for

monitoring their study progress, at least four times per semester. Furthermore, there are supervisors for the thesis, the fieldwork practice or teaching internship, and the community service, who give advice on specific issues related to these aspects. The university supports the students in finding a job in various ways. In the Mathematics as well as the Physics programme, there is a course on entrepreneurship, in which the students learn how to develop a business model and how to start a company. Moreover, for students of all programmes, job fairs are regularly organised and trainings for writing applications and CVs are offered.

During the discussions, the peers learn that there is also a system to support students with disabilities. The university has established a centre for special needs education that supports these students in their learning process and that helps the teaching staff to develop accessible learning media. The facilities for all programmes are accessible for students with disabilities.

The peers conclude that there are enough resources available to provide individual assistance, advice, and support for all students. The support systems help the students to achieve the intended learning outcomes to complete their studies successfully.

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

The peers thank Universitas Negeri Malang for providing additional information on the addressed issues. They appreciate that the university will revise the module handbooks and correct the conversion from SKS to ECTS. Until this is implemented, they advocate a requirement in this regard.

The peers consider criterion 2 partly fulfilled.

3. Exams: System, concept and organisation

Criterion 3 Exams: System, concept and organisation

Evidence:

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

Preliminary assessment and analysis of the peers:
For the examination of the students' achievement, each course has to determine objectives, which support the achievement of the overall learning outcomes of the respective programme. Accordingly, each course must assess whether all defined learning outcomes stated in the module description have been achieved. For this purpose, Universitas Negeri Malang utilises various types of examination.

In each course, the students have to pass written mid-term and final examinations. These commonly feature short answers, essays, problem-solving or case-based questions as well as calculation problems. Additionally, according to the Self-Assessment Report, quizzes, tests, practical performances, assignments, small projects, portfolios and presentations are employed to assess the students' achievement of the learning outcomes. At the first meeting of a course, the students are informed about what exactly is required to pass the module. It is common to hold small quizzes every two or three weeks, but there are generally no unscheduled tests. The final grade of each module is calculated based on the score of these individual kinds of assessment. The exact formula is given in the module handbook. Universitas Negeri Malang uses a grading system with the grades A, A-, B+, B, B-, C+, C, D and E, where a D (equivalent to a Grade Point of 1) is necessary to pass a module.

The peers discuss the various types of examination, particularly with regard to the practical courses, be it experimental or didactic. As it appears in the documents, there are also written mid-term and final exams in these courses. These can be supplemented by the assessment of small practical tasks, for instance laboratory experiments or applications of certain teaching methods. However, the peers are sceptical whether written exams can adequately ensure the achievement of the learning outcomes in these practical courses. Consequently, they encourage the university to employ types of examination that suit the kinds of skills that the students should acquire in these courses. If these exams are in fact not written but practical exams, they ask Universitas Negeri Malang to clarify this in the module handbooks.

The peers are particularly impressed by the way that the undergraduate thesis is handled. A seminar in the sixth semester familiarises the students with current research in the respective subject and enables them to develop their own topics and to write a proposal. This is then reviewed by the faculty and one or two supervisors are assigned accordingly. When the thesis is written in the seventh or final semester, there are meetings usually every week to guide the students' progress. Once the thesis is finished, the faculty appoints two examiners. Additionally, the students are encouraged to publish their theses as papers or to present them at conferences together with their supervisors. As is demonstrated by the publication of a number of theses in national and international journals, the peers deem this process very suitable to produce theses of high quality.

In the Self-Assessment Report, the university explains that it has a regulation to recognise external achievements as equivalent to the completion of certain courses. Scientific articles, but also sports medals or awards of other national and international championships are given as examples. The exact practice of this recognition remains unclear to the peers and they particularly ask Universitas Negeri Malang to clarify whether the Bachelor's thesis can be substituted by previous achievements of the students and if so, by what kinds of achievements.

The schedule for mid-term and final exams is prepared by the department and is communicated to the students at least two weeks before the start of the exam week. If a student cannot participate in the exam due to illness (with a doctor's certificate) or for another important reason, they can take the make-up exam that is scheduled no later than one week after the regular exam date. There is a defined objection process for students who feel that their grade does not adequately reflect their achievement of the learning outcomes. It is not yet clear to the peers what happens when a student fails an exam, for instance whether they can participate in the make-up exam or whether they have to retake the entire course and whether there are any limits on how often this can be done. Therefore, they ask the university to provide additional information on this issue.

As has already been mentioned (see chapters 2.1 and 2.2), the relatively small size of many modules leads to a high number of exams per semester and thus to a high workload for the students to prepare the mid-term and final exams as well as the small quizzes and other tests during the semester. The students say that they can handle this workload, but nevertheless the peers ask the university to constantly observe this situation and to ensure that the number of exams and the workload stays manageable.

All in all, the peers are satisfied with the regulations of exams in the four degree programmes. They appreciate the transparent procedures set up by Universitas Negeri Malang and the students confirm that the module requirements and exam dates are indeed communicated to them at the beginning of each semester. The students also emphasise that the grading system is fair and transparent. The peers inspect a sample of examination papers and final theses and are satisfied with the general quality of the samples.

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

The peers thank Universitas Negeri Malang for answering their open questions. They understand that in some courses, practical exams are employed, which is not yet clearly explained in the module handbooks. The peers appreciate that this will be clarified.

They also learn about the different options to recognise external achievements as substitutes for individual courses or for the Bachelor's thesis. In particular, the university elaborates that medals of national or international competitions can only be recognised if they are relevant to the field of the respective degree programme. Hence, the peers are satisfied with these regulations.

Lastly, the peers understand that students who fail an exam have to retake the course in one of the following semesters.

The peers consider criterion 3 mostly 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:
At Universitas Negeri Malang, the staff members have different academic positions. There are professors, associate professors, assistant professors, and lecturers. The academic position of each staff member is based on research activities, publications, academic education, supervision of students, and other supporting activities. This relies on regulations by the Indonesian Ministry of Education that determines certain minimum credit points of experience for reaching the next level. Every teaching staff has responsibilities in the fields of teaching (16 hours per week), research (16 hours per week), and community service (8 hours per week). Some are furthermore involved in the management of the programmes, the faculty or other university bodies, for which their other responsibilities are reduced.

There are 38 teaching staff for Mathematics (19 with PhD, 19 with Master's degree), 36 (25 with PhD, 11 with Master's degree) for Mathematics Education, 21 (7 with PhD, 14 with Master's degree) for Physics and 22 (11 with PhD, 11 with Master's degree) for Physics Education. The university encourages the teaching staff with a Master's degree to pursue further qualification and a considerable number of the respective staff are indeed studying

for a PhD. These numbers mean that the ratio between academic staff and students is between 1:14 and 1:20. In addition, the faculty regularly invites visiting lecturers from Indonesia and abroad to facilitate academic exchange.

Recruiting new teaching staff follows a defined procedure starting with a needs analysis of the degree programme, the proposal for new positions to the university, a public announcement and finally the recruitment based on the results of a basic competence test, a field competence test and an interview.

The academic staff is involved in a significant number of research projects funded by grants from the Indonesian government, the university itself or other research funds. Over the last years, Universitas Negeri Malang has focused on strengthening its research focus. This results in a considerable number of publications. If the respective grants allow it, students are involved in these projects, mostly through undergraduate theses.

In summary, the peers confirm that the composition, scientific orientation and qualification of the teaching staff are suitable for successfully implementing and sustaining the degree programmes.

Criterion 4.2 Staff development

Evidence:

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

Preliminary assessment and analysis of the peers:
According to the Self-Assessment Report, Universitas Negeri Malang encourages the continuing professional development of its staff. For this purpose, various opportunities are provided. There is a mandatory didactic training for new academic staff that encompasses curriculum design, teaching material, and innovative teaching and learning methods. Moreover, at the beginning of each semester workshops are held to refresh and to deepen didactic competences.

All teaching staff are encouraged to study abroad or to participate in international research projects and conferences in order to enhance their knowledge, increase their English proficiency and to build international networks. For this purpose, the university informs about possible scholarships either from Indonesia itself or from foreign governments to support academic mobility.

The peers discuss with the members of the teaching staff the opportunities to develop their personal skills and learn that the teachers are satisfied with the internal qualification programme at the university, their opportunities to further improve their didactic abilities and to spend some time abroad to attend conferences, workshops or seminars.

The peers consider the support mechanisms for the continuing professional development of the teaching staff adequate and sufficient.

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 university and the faculty are mainly funded by the Indonesian government, through the tuition fees and through grants for research projects. The figures presented by the university show that the faculty's income is stable and the funding of the degree programmes is secured. The academic staff emphasise that from their point of view, all four undergraduate programmes under review receive sufficient funding for teaching and learning activities. The students confirm this positive impression and state their satisfaction with the available resources.

In preparation of the audit, the university provides a number of videos showing the laboratories of the programmes. During the virtual on-site visit, the facilities of all programmes were shown in more detail. The peers notice that the lecture rooms are in a very good condition and equipped with modern technology. The university has teaching as well as high-quality research laboratories for physics. While the former partly feature low-cost equipment comparable to the standard of a public school to familiarise the students with this, the latter have high-tech equipment for all necessary areas of physics that deeply impress the peers. Overall, they notice that there are no bottlenecks due to missing equipment or a lacking infrastructure. The students confirm this positive impression during the discussion with the peers. They are satisfied with the available equipment and the technical infrastructure.

The university has licensed Microsoft Office and other standard software, but uses open access software for mathematics and physics, for instance equivalents to Matlab and GeoGebra. Students and teaching staff are satisfied with their functionality. The central library as well as the reading room of the faculty are well equipped overall, but could be improved regarding international literature, according to teaching staff and students. The peers recommend to provide the necessary funding for these improvements.

In summary, the peer group judges the available funds, the technical equipment, and the infrastructure with the requirements for adequately sustaining the degree programmes.

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

The peers thank Universitas Negeri Malang for the additional information and appreciate that more funding for international literature shall be provided. They consider criterion 4 fulfilled.

5. Transparency and documentation

Criterion 5.1 Module descriptions

Evidence:

- Module descriptions
- Website

Preliminary assessment and analysis of the peers:

The module handbooks for all four programmes have been published on the university's website and are thus accessible to the students as well as to all stakeholders. The peers observe that they contain information about the persons responsible for each module, the teaching methods and workload, the credit points awarded, the intended learning outcomes, the applicability, the examination requirements, and the forms of assessment, and details explaining how the final grade is calculated.

However, as has already been remarked in several chapters, some information is missing or insufficient. The learning outcomes are not always skills-based (see chapter 1.3), the types of examination and the prerequisites for individual modules not always clear (see chapters 2.1 and 3), the conversion to ECTS is not consistent (see chapter 2.2) and the module descriptions do not contain information on the date of the last changes. Therefore, the peers ask the university to revise the module handbooks to address the mentioned issues.

Besides that, the suggested literature is sometimes quite old. This is not regarded as a problem concerning the basics of mathematics and physics. However, particularly in the field of didactics, many things have changed over the last decades. Consequently, the peers would appreciate it if more up-to-date literature is used and suggested in the module descriptions.

Criterion 5.2 Diploma and Diploma Supplement

Evidence:

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

Preliminary assessment and analysis of the peers:
The peers confirm that the students of all four degree programmes under review are awarded a Diploma and a Diploma Supplement after graduation. The Diploma consists of a Diploma Certificate and a Transcript of Records. The Diploma Supplement contains all necessary information about the degree programme. The Transcript of Records lists all courses that the graduate has completed, the achieved credit points, grades, and cumulative GPA. However, an English-language Diploma Supplement seems not to be awarded automatically, but only on request of the students. The peers ask the university to award this 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.

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

university'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.

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

The peers thank Universitas Negeri Malang for the additional information and appreciate that the module handbooks will be revised to address the mentioned issues and that the university plans to automatically award Diploma Supplements in English in the future. Until this is implemented, they advocate requirements in this regard.

The peers consider criterion 5 partly 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:
The peers learn that there is an institutional system of quality management aiming at continuously improving the degree programmes. This system relies on internal (SPMI) as well as external (SPME) quality assurance.

SPME focuses on both national and international accreditations. Every degree programme and every Higher Education Institution in Indonesia has to be accredited by the national Accreditation Agency (BAN-PT). Universitas Negeri Malang as an institution as well as all four degree programmes under review have received the highest accreditation status (A) from BAN-PT. Moreover, the Physics programme has been certified by the ASEAN University Network Quality Assurance.

SMPI encompasses all activities focused on implementing measures for improving the teaching and learning quality at the university. At the Faculty of Mathematics and Natural

Sciences, there is a quality assurance unit and at the department level, there are additional quality assurance task forces responsible for these processes. The basis for internal quality assurance are the faculty's vision and mission, strategic plan and work programme. These documents contain current goals and targets that are used to measure the faculty's success. The university employs various methods of internal quality assurance, for instance a monitoring of the students' performance, regular surveys among students and graduates and a periodic internal audit.

Monitoring by the quality assurance bodies is conducted in a standardised way at three points of each semester: at the beginning (lesson plan, teaching materials, use of web portal, learning approach), in the middle (implementation of midterm exam, learning outcome achievement) and at the end (analysis of final exam, achievement of course learning outcomes etc.). The internal quality audit is conducted once a year for each degree programme and aims at regularly assessing the quality and sustainability of the programmes. It follows a standardised procedure and results in a report to the programme identifying potential for improvement.

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.

The peers are impressed by the sophisticated quality management system, which the university and the faculty have established. Yet, it is not clear to them in which way the students are informed about the results of the course evaluations and the actions, which may have been taken based on these results. Therefore, they ask the university to clarify this.

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

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

The peers thank Universitas Negeri Malang for providing additional information and understand that the students are informed about the results of the course evaluations via e-mail.

They consider criterion 6 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:

1. Please clarify whether the Bachelor's thesis and other modules can be substituted by previous achievements of the students and if so, by what kinds of achievements.
2. Please clarify, in which way students can make up a failed exam/course.
3. Please clarify if and how the students (particularly the students of the respective courses) are informed about the results of the course evaluation and the measures that the university takes to improve the programmes.

E Comment of the Higher Education Institution (30.07.2021)

The institution provided the following detailed statement:

1. CRITERION 1 (The Degree Programme: Concept, content & Implementation)
1.1 Related to the criterion 1.1 (objectives and learning outcomes of a degree programme)
a. ASIIN peers think that besides algebra and analysis, probability theory could be mentioned explicitly in the graduate profile of the mathematics programme as an important field of mathematics and as a basis for statistical analysis, which is taught in several modules of the programme.

Explanation:
Probability Theory is a basic and fundamental course for Statistical Analysis. The specific contribution of Probability Theory in terms of the graduate profile is as the prerequisite course for the advanced statistics' course, i.e. Statistical Quality Control, Regression Analysis, Design of Experiments, and Time-series Analysis. All of those courses support the graduate profile number 3 of the Mathematics programme, which is "**able to manage, analyze, and interpret data by applying the technology, then produce statistical data, its indicators, and disseminate it by prioritizing accuracy and precision**". Hence, we believe it is unnecessary to mention Probability Theory explicitly in the graduate profile.

b. **ASIIN peer also wonders what exactly the university means by the ability to conduct research**, which is included as a learning outcome in all programmes, although in different wordings. In the discussions, ASIIN peers learn that this is not supposed to imply the kind of innovative research in new areas that graduates of Master's degree programmes should typically be able to conduct. As the peers understand it, it rather refers to the independent application of established knowledge and methods to new questions within the respective discipline, which they consider a valuable objective in its own right.

Explanation:
Undergraduate students studying BMATH, BMATH-EDU, BPHY, and BPHY-EDU are **NOT** expected to carry out independent research and obtain an innovative finding in a new field. At the undergraduate level, students' research is limited to applying the findings of prior research related to the courses they have completed. The student's research findings are then suggested for publication in scholarly forums/journals. This publication, however, is not compulsory.
Additionally, the following defines the capacity to do research at the undergraduate level:
1. Strengthening courses related to research.
All degree programs include courses that support research such as research methods, educational research methods, seminar courses, experimental physics for the Physics degree program, as well as relevant elective courses.
These courses expose students to basic research techniques and experience.

Students participate in national and international seminars both inside and outside of the Universitas Negeri Malang.
2. Students are involved in research conducted by academic staff.
At least one student must be involved in the lecturer's research. Students carry out research on subjects/topics assigned by the lecturer and then add to the lecturer's research. This will prepare students to carry out research.
3. The Institute for Research and Community Service (LP2M) offers a student-focused research grant program. Students continue to get intensive assistance from their supervisors throughout this research process.
c. As the learning outcomes and graduate profiles of the programmes do not distinguish between different kinds of research explicitly and are thus not easily intelligible in this regard, the **ASIIN peers would appreciate if the university could clarify this aspect in the documents**.

Explanation:
The research topics are not explicitly included in the learning outcome and graduation profiles. However, we provide clear information about the research topics within the BPHY, and BPHY-EDU research groups (KBK - Field of Expertise Cluster) in each degree program's catalogue. This catalogue has been given directly to the students. For instance, the detailed information related to the research group of BPHY and BPHYEDU has also been provided at the website http://fisika.fmipa.um.ac.id/research-group/. For BMATH and BMATHEDU, detailed information about the research topics is delivered to students in the fifth semester on the meeting activity between Lecturers and Students. Students are also able to find the information at the banner on the first floor of building B24 or at the website (http://bit.um.ac.id/topicResearchMatUM).

1.2 Related to the criterion 1.3 (curriculum)
a. Regarding the **education programmes**, ASIIN peers would only recommend to strengthen the university's cooperation with private education organisations as an alternative career path for the students besides the public schools.

Explanation:
The university has partnered with private schools to establish Teaching Internships via the Development Center of Curriculum, Learning, and Assessment in the Educational and Learning Development Institute (LP3), albeit on a lesser scale than public schools. To foster collaboration in the education sector, BMATH-EDU and BPHY-EDU are currently working with private education organizations via the Ministry of Education and Culture's MBKM (Freedom to Learn - Independent Campus) initiative. For instance, degree programs will follow up cooperation with private educational institutions such as Muhammadiyah, Maarif, PGRI, Budi Mulia, and Nurul Jadid, as well as PP An-Nur Malang and the Blitar Nursing Academy. It aims to expand networking and employment opportunities for graduates, not only at public institutions, but also at private schools.

b. A**SIIN peers ask the university to revise the learning outcomes of the respective modules to clearly point out the skills and competences**, which the students acquire. The peers

detect significant room for improvement, is the presentation of the learning outcomes of the individual modules in the module handbooks. ASIIN peers see that these do not always refer to the skills that the students should acquire, but in some cases, only to the knowledge that they gain.

Explanation:
All degree programs will evaluate and update their module handbooks to include appropriate learning outcomes that explicitly relate to the skills or abilities that will be acquired.

2. CRITERION 2 (The degree programme: structures, methods and implementation)
2.1 Related to the criterion 2.1 (Structure and modules)

a. The peers notice that many modules are quite small in terms of credit points and they worry that this might lead to a very high number of exams per semester and consequently to a heavy workload for the students. They learn that this is to some extent countered by the fact that the length of the exams is proportionate to the amount of credit points for the module. The students also emphasise that they consider the workload high but manageable. **ASIIN peers suggest that the university could consider creating larger modules in the next curriculum revisions in order to keep the student workload and the number of exams per semester manageable.**

Explanation:
Although our course credits are small, the exam loads for students are still within reasonable limits. Students in BMATH and BMATH-EDU take NO more than 9 courses in a single semester, and hence, they will take NO more than 9 examinations in mid-term or final-term. Exams are also scheduled in such a manner that students take them NO more than twice a day and not consecutively. Meanwhile, in BPHY and BPHY EDU degree programs, the main reason for many modules having a small credit is the presence of practical courses in the semester. Practical and theoretical courses are separated by considering the technical reasons such as easier scheduling and the available number of experiment sets. In addition, since a number of theoretical classes average about 30 students and the number of practical classes is restricted to a maximum of 20 students, merging them is rather difficult. Although our course credits are small, the typical course of exams in each day is already taken into account the complexity of the courses. However, based on ASIIN peer recommendations, the practical courses will be considered merging into theoretical courses in the future. Furthermore, the exam load in all degree programs is also adjusted to the course credits, ensuring that courses with few credits likewise have a small exam load.

b. The module descriptions are not always clear regarding the mandatory and recommended prerequisites for taking certain modules. As the peers learn in the discussions, there appear to be mandatory prerequisites in many cases to ensure that the students have acquired the necessary knowledge and skills. ASIIN peers normally do not show up in the

module descriptions, however, making it unnecessarily difficult for students to plan their course. Therefore, **ASIIN peers ask Universitas Negeri Malang to clarify this in the module handbooks.**

Explanation:
We have presented the prerequisite courses in the module handbook. If the column for the prerequisite courses is empty, it means that there are no prerequisite courses in that course. However, we will ensure that information regarding prerequisite courses is included in each module's handbook.

c. 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.

Explanation:
According to the curriculum of the degree programs, we believe that the best time for students to participate in student mobility is during semester 5 through the MBKM program. Students have adequate academic knowledge, skills and ability during that semester to participate in the student mobility program.

d. ASIIN peers remark that the effective amount of mobility to other higher education institutions in Indonesia or abroad is still relatively low. Furthermore, many of the stays abroad are quite short and most of them are restricted to South-East Asia. **The peers emphasise** that it is very useful for students to spend some time abroad already during their Bachelor's studies to improve their English proficiency, to get to know other educational systems, and to enhance their job opportunities.

Explanation:
For the national mobility program, students may participate in internships in companies, industries, or schools for one semester via the MBKM program administered by the Ministry of Education and Culture. It is possible to convert up to 20 credits from the internship program to elective courses in the degree program.
We agree with the idea of student mobility programs overseas. The Faculty of Mathematics and Natural Sciences (FMIPA) attempts to establish a longer-term collaboration with many institutions overseas via memorandums of understanding. For the time being, the faculty continues to support the funding for student mobility. The faculty will seek funding in the future from the University, the Ministry, or other sources.

2.2 Related to the criterion 2.2 (workload and credits)

a. As the university explains, the conversion of SKS into ECTS depends on the type of activity. For theory and practice courses, the ratio is supposedly 1:1.59, whereas for internship and community service it is 1:1.82. The peers point out that, given that 1 SKS equals 170 minutes per semester week regardless of the activity, this cannot be true. The difference may be due to the fact that midterm and final exam are not included for the university courses. However, as mandatory parts of the modules, they should be included and as a

result, there should be a single conversion rate between SKS and ECTS. **The peers ask the university to apply this conversion rate uniformly in all module handbooks to correct the noted inconsistencies.**

Explanation:
All degree programs will revise the conversion of SKS to ECTS in theory and practical courses to account for mid-term and final-term exams, achieving a ratio of about 1:1.82. As a result, the conversion ratio of SKS to ECTs is the same in theoretical and practical courses as it is in internships and community services.

b. 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. **ASIIN peers recommend that the university establish a systematic monitoring of the student workload for the individual modules, for example within the existing course evaluation.**

Explanation:
The SIAKAD (academic information) system has restricted course programming depending on the previous semester's GPA. The degree program has scheduled no more than three courses each day for students. Additionally, the degree program has scheduled the mid-term and final-term exams no more than two courses on a single day.
Individual work, on the other hand, is not yet monitored in a systematic manner. This is excellent advice for the university. The university will try to establish an effective mechanism at SIAKAD for monitoring student workloads in individual courses.

3. CRITERION 3 (System, concept and organization)
3.1 Related to the criterion 3 (Exams: System, concept and organization

a. **T**he peers are sceptical whether written exams can adequately ensure the achievement of the learning outcomes in these **practical courses**. Consequently, ASIIN peers encourage the university to employ types of examination that suit the kinds of skills that the students should acquire in these courses. **If these exams are in fact not written but practical exams, ASIIN peers ask Universitas Negeri Malang to clarify this in the module handbooks**.

Explanation:
Indeed, practicum courses often include a test, particularly a practical exam, rather than a written exam. We will enhance the module handbook for this type of practicum course exam, particularly BPHY and BPHY-EDU.

b. ASIIN peers particularly ask Universitas Negeri Malang to clarify whether the Bachelor's thesis can be substituted by previous achievements of the students and if so, by what kinds of achievements.

Explanation:

See part D for more details (page 10 in this document). We answer this question in part D.

c. It is not yet clear to the peers what happens when a student fails an exam, for instance whether they can participate in the make-up exam or whether they have to retake the entire course and whether there are any limits on how often this can be done. Therefore, **ASIIN peers ask the university to provide additional information on this issue.**

Explanation:
According to the 2020 UM Education Guidelines, students who fail an exam or course are NOT eligible for remediation. Students may enroll in these courses the next semester, either during the short or regular semesters. Additionally, the university offers special programs for students who do not pass the course in order to assist students who are nearing the end of their study period. Students from the beginning of the semester are informed of the exam schedule, allowing enough time to prepare.

d. The relatively small size of many modules leads to a high number of exams per semester and thus to a high workload for the students to prepare for the mid-term and final exams as well as the small quizzes and other tests during the semester. The students say that they can handle this workload, but nevertheless, **the peers ask the university to constantly observe this situation and to ensure that the number of exams and the workload stays manageable.**

Explanation:
This issue will be addressed in the upcoming curriculum revision, taking the number of modules and student exam loads into consideration across all degree programs. We handle examinations by ensuring that students do not take them more than twice a day. Additionally, we ensure that no student has two consecutive examinations in a single day.

4. CRITERION 4 (Resources)
4.1 Related to the criterion 4.3 (Funds and equipment)

a. The central library as well as the reading room of the faculty are well equipped overall, but could be improved regarding international literature, according to teaching staff and students. **The peers recommend to provide the necessary funding for these improvements.**

Explanation:
The faculty will propose extra funding from the university to provide more international literature.

5. CRITERION 5 (Transparency and documentation)
5.1 Related to the criterion 5.1 (Module descriptions)

a. Some information is missing or insufficient. The learning outcomes are not always skills-based (see chapter 1.3), the types of examination and the prerequisites for individual modules not always clear (see chapters 2.1 and 3), the conversion to ECTS is not consistent (see chapter 2.2) and the module descriptions do not contain information on the date of the last changes. Therefore, **the peers ask the university to revise the module handbooks to address the mentioned issues**

Explanation:
All degree programs will review and revise the module handbook in response to suggestions and feedback from ASIIN's peers. This will include revisions to skill-based learning outcomes, exam types, prerequisite courses, credit conversion to ECTS, and information about the date of the most recent revisions in each module handbook.

b. The suggested literature is sometimes quite old. This is not regarded as a problem concerning the basics of mathematics and physics. However, particularly in the field of didactics, many things have changed over the last decades. Consequently, **the peers would appreciate it if more up-to-date literature is used and suggested in the module descriptions.**

Explanation:
We will evaluate and update the module handbook to include more recent and up-to-date literatures or references in each module, with a particular emphasis on education programs.

5.2 Related to the criterion 5.2 (Diploma and diploma supplement)

a. An English-language Diploma Supplement seems not to be awarded automatically, but only on request of the students. **The peers ask the university to award this automatically in the future**

Explanation:
The university has considered this issue carefully. The Diploma Supplement will be awarded automatically.

b. **The peers 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.**

Explanation:
As previously mentioned, all degree programs will update their module handbooks to reflect the revised conversion of ECTS rounded to integers.

6. CRITERION 6 (Quality management: quality assessment and development)
6.1 Related to the criterion 6 (Quality management: quality assessment and development)

a. The peers are impressed by the sophisticated quality management system, which the university and the faculty have established. Yet, it is not clear to them in which way the students are informed about the results of the course evaluations and the actions, which may have been taken based on these results. Therefore, **the peers ask the university to clarify this**

Explanation:
The degree program will summarize the results of the students' evaluation, which will subsequently be sent to students through e-office (students' email). The results of the lecturer's performance assessment by the faculty leaders will also be sent to students through e-office.

Additional Documents (Section D)
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:

1. Please clarify whether the Bachelor's thesis and other modules can be substituted by previous achievements of the students and if so, by what kinds of achievements.

Explanation:
The complete form and mechanism for recognising students achievement are specified in the UM Rector Regulation Number 18 of 2019 (bit.um.ac.id/Recognition) and the 2020 Education Guidelines (bit.um.ac.id/EduGuide). As a summary, we have the following:

Point	Student achievement	Can besubstituted as Bachelor's Thesis	Can besubstituted as other modules
A	Writing a Book (i.e. a Teacher Book, Monograph, Book of Reference, Translating a Book, or other similar written works which have ISBN) which relevant to the field of expertise of the degree program and as the first author	V	X
B	Proposal and Final Report of Research which is funded by BELMAWA DIKTI*, Business Innovation Proposal and its Final Report which is funded by BELMAWA DIKTI, or Entrepreneurship's Proposal and its Final Report which is funded by BELMAWA DIKTI as the first author or the main coordinator	V	X

C	Proposal and Final Report of Research which is funded by BELMAWA DIKTI, Business Innovation Proposal and its Final Report which is funded by BELMAWA DIKTI, or Entrepreneurship's Proposal and its Final Report which is funded by BELMAWA DIKTI as the team's member, NOT the first author, NOT the main coordinator	X	V
D	Students' written work which is presented at National Student Scientific Week (PIMNAS) which is funded by BELMAWA DIKTI as the first author or the main coordinator	V	X
E	Students' written work which is presented at National Student Scientific Week (PIMNAS) which is funded by BELMAWA DIKTI as the team's member, NOT the first author, NOT the main coordinator	X	V
F	Product and student's achievement by getting a medal from 23 National Events or 6 International Events listed by BELMAWA DIKTI as individual or group	V	X
G	Medal's Achievement from SEA Games or Asian Games or Olympic **which is relevant to the field of expertise of degree program**, as individual or group by writing an independent report	V	X
H	Medal's Achievement from PON (National Sport's Events) affiliated by West Java and Universitas Negeri Malang, as individual or group **which is relevant to the field of expertise of degree program**	V	X
I	Student's Achievement on International Level which is relevant to the field of expertise of degree program	V[1]	V
J	Student's Achievement on National Level which is not stated as at point D, E, F, or G.	V[1]	V

K	Joining National Training Center or Equivalent Event for at least 6 months	X	V
L	Entrepreneurship Program on National Level which is NOT funded by BELMAWA DIKTI	X	V
M	A Scientific Article which is relevant to the field of expertise of degree program, as the first author, published by **International Journal** indexed by Scopus or Web of Science	V	X
N	A Scientific Article which is relevant to the field of expertise of degree program, as the first author, published by **International Proceedings** indexed by Scopus or Web of Science	V	X
O	A Scientific Article which is relevant to the field of expertise of degree program, as the first author, published by **International Journal** indexed by others, except Scopus or Web of Science	V	X
P	A Scientific Article which is relevant to the field of expertise of degree program, as the first author, published by **National Journal** indexed by SINTA**	V	X
Q	A Scientific Articles which is relevant to the field of expertise of degree program, as the first author, and winning a competition	V	X
R	A Scientific Article which is presented on Seminar at National Level, Regional Level, Local Level, or published at a Magazine having ISSN	X	V
S	A product that has a copyright	V	X
T	Product as a movie	V	X

Note:
*) BELMAWA DIKTI is the task force under the Ministry of Research, Technology and Higher Education of Indonesia which handles the teaching-learning and students affairs.
**) SINTA is the Indonesian Indexing for Scientific Journal.
1) recognition is conditional on the outcomes.

2. Please clarify, in which way students can make up a failed exam/course.

Explanation:
According to the 2020 UM Education Guidelines, students who fail an exam or course are NOT eligible for remediation. Students may enroll in these courses the next semester, either during the short or regular semesters. Additionally, the university offers **special programs** for students who do not pass the course in order to assist students who are nearing the end of their study period.

3. Please clarify if and how the students (particularly the students of the respective courses) are informed about the results of the course evaluation and the measures that the university takes to improve the programmes.

Explanation:
Until recently, degree programs have communicated the outcomes of learning evaluations to students through regular meetings (which we refer to as “sarasehan”) attended by lecturers and students. In the future, we will provide an effective mechanism for students to see the outcomes of course evaluations. The results of the evaluation process will be informed to students through the e-office.

F Summary: Peer recommendations (06.08.2021)

Taking into account the additional information and the comments given by Universitas Negeri Malang, 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 Mathematics	With requirements	–	30.09.2027
Ba Mathematics Education	With requirements	–	30.09.2027
Ba Physics	With requirements	–	30.09.2027
Ba Physics Education	With requirements	–	30.09.2027

Requirements

For all degree programmes

A 1. (ASIIN 2.2) Ensure that the conversion from SKS to ECTS is correct for all modules.

A 2. (ASIIN 1.3, 2.1, 3, 5.2) Revise the module handbooks to ensure that the learning outcomes are skills-based, that the types of examination and the prerequisites for individual modules are clearly defined and that the date of the last changes is given for each module.

A 3. (ASIIN 5.2) A Diploma Supplement in English has to be awarded to the students automatically after graduation.

Recommendations

For all degree programmes

E 1. (ASIIN 1.1) It is recommended to clarify the kind of research graduates are able to conduct in the learning outcomes of the programmes.

E 2. (ASIIN 2.1, 2.2) It is recommended to increase the average size of the modules.

E 3. (ASIIN 2.2, 6) It is recommended to measure the actual student workload for the individual courses in a systematic fashion.

E 4. (ASIIN 4.3) It is recommended to extend access to international literature.

For the Bachelor's degree programmes Mathematics Education and Physics Education

E 5. (ASIIN 5.2) It is recommended to suggest more up-to-date literature, particularly regarding matters of didactics.

G Comment of the Technical Committees (06.09.2021)

Technical Committee 12 – Mathematics (06.09.2021)

Assessment and analysis for the award of the ASIIN seal:

The Technical Committee discusses the procedure and agrees with the assessment of the peers.

The Technical Committee 12 – Mathematics recommends the award of the seals as follows:

Degree Programme	ASIIN-seal	Subject-specific label	Maximum duration of accreditation
Ba Mathematics	With requirements	–	30.09.2027
Ba Mathematics Education	With requirements	–	30.09.2027

Technical Committee 13 – Physics (06.09.2021)

The Technical Committee discusses the procedure and largely agrees with the peers. It debates about recommendation E3 and about whether it is necessary to convert this into a requirement to ensure an adequate workload for the students. However, as the peers have noticed no pressing issues in this regard, the TC agrees that a recommendation is sufficient. Additionally, it is suggested to include a remark in the letter to the university to emphasise that the systematic evaluation of the student workload will be discussed in the re-accreditation procedure.

The Technical Committee 13 – Physics recommends the award of the seals as follows:

Degree Programme	ASIIN-seal	Subject-specific label	Maximum duration of accreditation
Ba Physics	With requirements	–	30.09.2027
Ba Physics Education	With requirements	–	30.09.2027

H Decision of the Accreditation Commission (17.09.2021)

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

The Accreditation discusses the procedure and largely agrees with the assessment of the peers and the Technical Committees. To emphasise the point made by the Technical Committee 13, it changes the wording of recommendation E 3, but it does not consider an additional emphasis necessary, as all recommendations will be discussed in a reaccreditation procedure either way.

The Accreditation Commission decides to award the following seals:

Degree Programme	ASIIN-seal	Subject-specific label	Maximum duration of accreditation
Ba Mathematics	With requirements	–	30.09.2027
Ba Mathematics Education	With requirements	–	30.09.2027
Ba Physics	With requirements	–	30.09.2027
Ba Physics Education	With requirements	–	30.09.2027

Requirements

For all degree programmes

A 1. (ASIIN 2.2) Ensure that the conversion from SKS to ECTS is correct for all modules.

A 2. (ASIIN 1.3, 2.1, 3, 5.2) Revise the module handbooks to ensure that the learning outcomes are skills-based, that the types of examination and the prerequisites for individual modules are clearly defined and that the date of the last changes is given for each module.

A 3. (ASIIN 5.2) A Diploma Supplement in English has to be awarded to the students automatically after graduation.

Recommendations

For all degree programmes

E 1. (ASIIN 1.1) It is recommended to clarify the kind of research graduates are able to conduct in the learning outcomes of the programmes.

E 2. (ASIIN 2.1, 2.2) It is recommended to increase the average size of the modules.

E 3. (ASIIN 2.2, 6) It is strongly recommended to measure the actual student workload for the individual courses in a systematic fashion.

E 4. (ASIIN 4.3) It is recommended to extend access to international literature.

For the Bachelor's degree programmes Mathematics Education and Physics Education

E 5. (ASIIN 5.2) It is recommended to suggest more up-to-date literature, particularly regarding matters of didactics.

I Fulfilment of Requirements (23.09.2022)

Analysis of the peers and the Technical Committees 12 - Mathematics and 13 – Physics (12.09.2022)

Initial Treatment	
Peers	fulfilled Justification: UNM has recalculated the conversion from SKS to ECTS and used the formula to correct the workload for every module.
TC 12	fulfilled Vote: unanimous Justification: The TC agrees with the opinion of the peer panel.
TC 13	fulfilled Vote: unanimous Justification: The TC agrees with the opinion of the peer panel.

A 1. (ASIIN 1.3, 2.1, 3, 5.2.2) Revise the module handbooks to ensure that the learning outcomes are skills-based, that the types of examination and the prerequisites for individual modules are clearly defined and that the date of the last changes is given for each module.

Initial Treatment	
Peers	fulfilled Justification: UNM has initiated a revision process and involved all academic staff members in this activity. Learning outcomes, examination types and the prerequisites for individual modules have been checked and are clearly defined now. UNM also added an indication to the date of the last changes for every module. The new module handbooks have been published to the website.
TC 12	fulfilled Vote: unanimous Justification: The TC agrees with the opinion of the peer panel.
TC 13	fulfilled Vote: unanimous Justification: The TC agrees with the opinion of the peer panel.

A 2. (5.2) A Diploma Supplement in English has to be awarded to the students automatically after graduation.

Initial Treatment	
Peers	fulfilled Justification: UNM is now awarding a diploma supplement by default.
TC 12	fulfilled Vote: unanimous Justification: The TC agrees with the opinion of the peer panel.
TC 13	fulfilled Vote: unanimous Justification: The TC agrees with the opinion of the peer panel.

Decision of the Accreditation Commission (23.09.2022)

The accreditation commission discusses the procedure and follows the assessment of the peers and the technical committees 12 and 13.

The Accreditation Commission decides to award the following seals:

Ba Physics Education	All requirements fulfilled		30.09.2026
Ba Physics	All requirements fulfilled		30.09.2026
Ba Mathematics Education	All requirements fulfilled		30.09.2026
Ba Mathematics	All requirements fulfilled		30.09.2026

Appendix: Programme Learning Outcomes and Curricula

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

"The BMATH objectives are formulated as follows:
1. To produce quality mathematics graduates and to produce quality academic works in mathematics field.
2. To produce researches in mathematics and its applications that are useful for science development and community.
3. To produce community services by applying mathematics and its applications which are oriented on community empowerment.

The intended qualification profile for BMATH in general is as follows:
Mathematics graduates that are capable to design, implement, and report researches regarding the field of Mathematics, and have the characteristic of problem solver, competitive, adaptive, and flexible to the challenges in life in the framework of scientific behavior based on science and technology development and Pancasila values.

In particular, intended graduate profile for BMATH is expected to have the following characteristics:
1. able to design, implement, and report researches in the fields of analysis, algebra, modeling, applied mathematics, and its application in various fields, as well as disseminate it by prioritizing honesty, transparency, and accountability;
2. able to analyze problems, formulate algorithm, and implement it in the form of software and disseminate it by prioritizing innovation, accuracy, efficiency, and effectivity;
3. able to manage, analyze, and interpret data by applying the technology, then produce statistical data, its indicators, and disseminate it by prioritizing accuracy and precision;
4. to possess entrepreneurship based on Pancasila values.

Interdisciplinary Learning Outcome
LO1 Possesses the knowledge and ability by showing the behavior as religious citizens, adore the country, nation, and culture of Indonesian based on Pancasila values, possesses the independency in innovative, adaptive, and critical works in accordance with global dynamics.

Specialist Learning Outcome
LO2 Masters mathematical facts and concepts, and able to critically and creatively apply

mathematical principles and procedures to solve mathematical problems.
LO3 Capable to design, implement, and report the research in the fields of analysis, algebra, modeling, applied, and its implementation in various fields and disseminates it by emphasizing honesty, openness, and accountability.
LO4 Capable to access, process, analyze, and interpret information or data assisted by information technology and produces statistical data and indicators with a transdisciplinary approach and disseminate them by emphasizing accuracy and precision.
LO5 Capable to analyze the problems, formulate the algorithms, and implement them on valid software and disseminates them"

The following **curriculum** is presented:

Course Code	Course Name	credits
1st Semester		
UNIVUM6007	Pancasila Education	2
NMATUM6001	Introduction to Algebra	3
NMATUM6002	Trigonometry	2
NMATUM6003	Introduction to Geometry	3
NMATUM6004	Foundations of Mathematics	3
NMATUM6005	Basic Computer Programming	3
NMATUM6006	Statistical Methods	3
FMIAUM6001	Basic of Sciences	2
	Total	21

Course Code	Course Name	credits
2nd Semester		
UNIVUM6001/ UNIVUM6002/ UNIVUM6003/ UNIVUM6004/ UNIVUM6005/ UNIVUM6006/ UNIVUM6014	Education on Religion	3
NMATUM6007	Analytical Geometry	2
NMATUM6008	Calculus	4
NMATUM6009	Elementary Linear Algebra	3
NMATUM6010	Number Theory	3
NMATUM6011	Discrete Mathematics	2
NMATUM6012	Graph Theory	3
	Total	20

Course Code	Course Name	credits
3rd Semester		
UNIVUM6009	Indonesian for Academic Purposes	2

Course Code	Course Name	credits
4th Semester		
UNIVUM6008	Civic Education	2

NMATUM6014	Multivariable Calcu-lus	3
NMATUM6013	Advanced Calculus	3
NMATUM6015	Introduction to Probability	3
NMATUM6016	Introduction to Sequence Theory	3
NMATUM6017	Introduction to Group	3
NMATUM6018	Operation Research	3
	To-tal	20

NMATUM6019	Complex Functions	3
NMATUM6020	Introduction to Metric Space Theory	3
NMATUM6021	Ordinary Differential Equation	3
NMATUM6022	Introduction to Ring	3
NMATUM6023	Introduction to Math-ematical Statistics	3
NMATUM6024	Computer Program-ming	3
	To-tal	20

Course Code	Course Name	cred-its
	5th Semes-ter	
UNI-VUM6010	Innovation Manage-ment	3
NMA-TUM6025	Entrepreneurship	2
NMA-TUM6026	Research in Mathematics	2
NMA-TUM6048	Introduction to Math-ematical Modelling	3
NMA-TUM6059	Time-series Analysis	3
	MPPD 1	3
	MPPD 2	3
	To-tal	19

Course Code	Course Name	Credits
	6th Semes-ter	
NMATUM6027	Numerical Methods	2
NMATUM6028	Seminar of Bachelor's Thesis Proposal	2
UKKNUM6090	Student Community Engagement	4
	MPPD 3	3
	MPPD 4	3
	MPPD 5	3
	MPPD 6	3
	To-tal	20

Course Code	Course Name	cred-its
	7th Semes-ter	
UPKLUM6090	Fieldwork Practice	4
NMA-TUM6100	Bachelor's Thesis	4
	MPPD 7	3
	MPPD 8	3
	MPPD 9	3
	MPPD 10	3
	To-tal	20

Course Code	Course Name	cred-its
	8th Semes-ter	
	MPPD 11	3
	MPPD 12	3
	Total	6

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

"The objectives of BMATH-EDU are formulated as follows:
1. To produce mathematics education graduates with student-centered mathematics learning, apply effective learning approaches, and optimize the utilization of technology.
2. To produce quality academic works in the field of mathematics education through mathematics education researches that are useful for science development and community.
3. To produce community service by applying mathematics and mathematics education which are oriented on community empowerment in the form of scientifical information service, the implementation of researches' results, training, workshops, skill education programs, continuous education programs, enhancing the role of alumnae as a partner to develop BMATH-UM.

The intended qualification profile for BMATH-EDU in general is as follows:
Mathematics education graduates that are capable in mastering mathematical concepts, teaching in mathematics, creating and developing mathematics learning media, and conducting mathematics education researches by adapting to technology and social culture development, also, having the personality of entrepreneurship based on Pancasila values.

Interdisciplinary Learning Outcome
LO1 Possesses the knowledge and ability by showing the behavior as religious citizens, adore the country, nation, and culture of Indonesian based on Pancasila values, possesses the independency in innovative, adaptive, and critical works in accordance with global dynamics.

Specialist Learning Outcome
LO2 Possessing the insight and knowledge of mathematics education and learning
LO3 Mastering the basic concepts of mathematics, secondary school mathematics, and advanced mathematics, as well as pedagogical concepts in the development of mathematics education
LO4 Capable in applying the latest learning technology in mathematics learning
LO5 Capable in developing secondary school mathematics teaching materials and mathematics learning media innovatively and creatively
LO6 Capable in solving problems in mathematics education through researches in mathematics education
LO7 Possessing the insight, knowledge, and skills in mathematics education practice"

The following **curriculum** is presented:

Course code	Course name	Credits
Semester 1		
UNIVUM6007	*Pancasila* Education	2
PMATUM6001	Basics Computer Programming	3
UNIVUM6011	Introduction to Education Sciences	2
PMATUM6002	Introduction to Algebra	3
PMATUM6003	Statistical Methods	3
PMATUM6004	Introduction to Geometry	3
PMATUM6005	Trigonometry	2
PMATUM6006	Fundamental Mathematics	3
	Total	**21**
Semester 3		
UNIVUM6013	Learning and Instruction	3
PMATUM6011	Mathematics Instructional Media	3
PMATUM6012	Introduction to Probability	3
PMATUM6013	Discrete Mathematics	2
UNIVUM6009	Indonesian for Academic Purposes	2
PMATUM6014	Introduction to Group	3
PMATUM6015	Numerical Method	2
PMATUM6016	Curriculum and Mathematics Instruction Design	3
	Total	**21**
Semester 5		

Course code	Course name	Credits
Semester 2		
UNIVUM6001-UNIVUM6006, UNIVUM6014	Education on Religion	3
FMIAUM6001	Basics of Science	2
UNIVUM6012	Learner Development	3
PMATUM6007	Analytical Geometry	2
PMATUM6008	Calculus	4
PMATUM6009	Elementary Linear Algebra	3
PMATUM6010	Number Theory	3
	Total	**21**
Semester 4		
PMATUM6017	Assessment in Mathematics Instruction	2
PMATUM6018	Mathematics Learning Materials	3
UNIVUM6008	Civics Education	2
PMATUM6019	Introduction to Sequence Theory	3
PMATUM6020	Graph Theory	3
PMATUM6021	Practice on Micro Instruction of School Mathematics: Algebra, Logics, and Trigonometry	4
PMATUM6022	Practice on Micro Instruction of School Mathematics: Geometry, Calculus, and Statistics	4
	Total	**21**
Semester 6		

UNIVUM6010	Innovation Management	3
PMATUM6023	Entrepreneurship	2
PMATUM6024	Research in Mathematics Education	2
PMATUM6026	Management of Mathematics Classroom	3
PMATUM6027	Mathematics Instruction Strategies	3
	Elective Courses	6
	Total	**19**
Semester 7		
UPLPUM6090	Teaching internship	4
PMATUM6100	Bachelor's Thesis	4
	Elective Courses	3
	Total	**11**

PMATUM6025	Seminar of Bachelor's Thesis Proposal	2
UKKNUM6090	Student Community Engagement	4
	Elective Courses	15
	Total	**21**
Semester 8		
	Elective Courses	12
	Total	**12**

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

"The objectives of BPHY are as follow.
1. To produce graduates who are knowledgeable, religious, noble, independent, and able to develop professionally in the field of physics.
2. To produce superior scientific and creative works in physics.
3. To produce community service works in physics to create independent, productive, and wealthy society.

The graduate profile of BPHY is formulated by referring to the analysis results of national qualification standard, science and technology development, SWOT analysis, Tracer Study, need-analysis of the stakeholders, institution vision and mission. The graduate profile of BPHY is "Physics graduates who are innovative, adaptive, independent, and could implement physics science and methodology in material physics, optoelectronics, geophysics and astronomy; able to disseminate the analysis results by utilizing Information and Communications Technology (ICT) to have high acceptability and flexibility in the global competition era."

The expected professions for BPHY graduates have the following properties.
1. To comprehend physics science and methodology, able to apply and solve problems related to it.

2. Able to continually develop the knowledge and interest in physics in formal and informal manners.
3. Innovative, adaptive, independent, able to take initiative and lead a working group in the field.
4. To possess the skill to communicate ideas orally and written, as well as capable of implementing it in the field of works.

Learning Outcomes

LO 1 To comprehend theoretical concepts and basic principles of classical physics and modern physics and its application in relevant problems.
LO 2 To comprehend mathematical and computation skills to solve physics problems.
LO 3 To comprehend instrumentation skills in physics to solve physics problems and apply it in interdisciplinary problems.
LO 4 Capable to demonstrate the proficiency of other sciences that support physics.
LO 5 Capable to demonstrate the ability to apply the methods of measurements and experiments in physics problems and its application.
LO 6 Capable to demonstrate the proficiency of certain case in physics that support field of expertise by utilizing information technology from various sources.
LO 7 To comprehend research skills in specific fields of physics adaptive to new things in experimental, theoretical, and computational manners under the direction of the supervisor.
LO 8 To comprehend the skills to communicate research results in oral, written, and visual forms by referring to norms of science according to National and/or International standards.
LO 9 To comprehend specific sciences that could adapt well to work environment and able to develop it for future research.
LO 10 To possess the knowledge and ability by showing the behavior as religious citizens, adore the country, nation, and culture of Indonesian based on Pancasila values, possesses the independency in innovative, adaptive, and critical works in accordance with global dynamics."

The following **curriculum** is presented:

Course code	Course name	credits
	Semester 1	
UNIVUM6007	Pancasila Education	2

Course code	Course name	credits
	Semester 2	
UNIVUM6001	Religion Education	3

NFISUM6101	Fundamentals of Physics I	4
NFISUM6131	Experiments on Fundamentals of Physics I	1
NFISUM6151	Calculus I for Physics	3
FMIAUM6001	Basics of Science	2
NFISUM6301	English for Physics	2
NFISUM6130	Basics of Physics Instrumentation	2
NFISUM6601	Biology	2
NFISUM6302	Science- Based Entrepreneurship	2
	Total	**20**
	Semester 3	
UNIVUM6009	Indonesian For Academic Purposes	2
NFISUM6104	Classical Mechanics	3
NFISUM6105	Vibration and Waves	2
NFISUM6106	Thermodynamics	3
NFISUM6107	Special Relativity Theory	2
NFISUM6135	Experiments on Electronics II	1
NFISUM6136	Experiments on Classical Mechanics	1
NFISUM6137	Experiments on Computational Physics	1
NFISUM6154	Electronics II	2
NFISUM6155	Computational Physics	2
NFISUM6156	Mathematical Methods for Physics I	3
	Total	**22**
	Semester 5	
UNIVUM6010	Innovation Management	3
NFISUM6111	Statistical Physics	2

NFISUM6102	Fundamentals of Physics II	4
NFISUM6103	Fundamentals of Physics III	4
NFISUM6132	Experiments on Fundamentals of Physics II	1
NFISUM6133	Experiments on Fundamentals of Physics III	1
NFISUM6134	Experiments on Electronics I	1
NFISUM6152	Calculus II for Physics	3
NFISUM6153	Electronics I	2
NFISUM6602	Chemistry	2
	Total	**21**
	Semester 4	
UNIVUM6008	Civics Education	2
NFISUM6108	Quantum Physics	3
NFISUM6109	Electromagnetism	3
NFISUM6110	Optics	2
NFISUM6138	Experiments on Optics	1
NFISUM6139	Experiments on Electromagnetism	1
NFISUM6157	Mathematical Methods for Physics II	3
NFISUM6158	Research Methodology for Physics	2
	Elective Courses	6
	Total	**23**
	Semester 6	
NFISUM6114	Nuclear Physics and Particles	2
NFISUM6115	Solid State Physics	3

NFISUM6112	Atomic Physics and Molecule	2
NFISUM6113	Electrodynamics	3
NFISUM6140	Experiments on Atomic Physics	1
NFISUM6141	Experimental Physics	2
	Elective Courses	9
	Total	**22**
	Semester 7	
UPKLUM6090	Fieldwork Practice	4
UKKNUM6090	Student Community Engagement	4
	Elective Courses	8
	Total	**16**

NFISUM6116	Physics Seminar	2
	Elective Courses	9
	Total	**16**
	Semester 8	
NFISUM6100	Undergraduate Thesis	6
	Total	**6**

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

"The objectives of BPHY-EDU are as follow.
1) To produce graduates that have the academy competence of physics education, pious, have noble character, smart, independent, have national commitment, and could develop professionally.
2) To produce academic works regarding physical education and quality technology.
3) To produce community service works by implementing physics education and technology to create independent, productive, and wealthy society.

Based on the objectives of BPHY-EDU, the graduate profile of BPHY-EDU is "Physics education graduates that are innovative, adaptive, independent, able to implement the knowledge, able to disseminate the study results by utilizing ICT".

Learning Outcomes
LO1 To possess the knowledge and ability by showing the behavior as religious citizens, adore the country, nation, and culture of Indonesian based on Pancasila values, possesses the independency in innovative, adaptive, and critical works in accordance with global dynamics.
LO2 To have the value and knowledge of education and learning sciences both theoretically and applicatively, within Indonesian culture, of their roles as educators with the following qualities: critical, innovative, and communicative, with the characteristics and culture of educators in the global era.
LO3 To master theoretical concepts and basic principles of classical and modern physics and their application in relevant problems.

LO4 Skillful in mathematics and computation to solve physics problems.
LO5 To master problem-based laboratory and physics instrumentation skills.
LO6 Skillful in designing, implementing, and assessing physics learning by utilizing information technology and communication
LO7 Skillful in developing and managing media and learning resources to support physics learning
LO8 Skillful in planning and carrying out research to solve physics learning problems and communicate scientifically
LO9 To have communication skills and knowledge in Indonesian and English.

The following **curriculum** is presented:

Course code	Course name	credits
	Semester 1	
UNIVUM6007	Pancasila Education	2
UNIVUM6011	Introduction of Education	2
PFISUM6101	Fundamentals of Physics I	4
PFISUM6201	Experiments on Fundamentals of Physics I	1
PFISUM6301	Calculus for Physics	3
FMIAUM6001	Basics of Science	2
PFISUM6401	Science-Based Entrepreneurship	2
PFISUM6501	English for Physics	2
PFISUM6601	Basics of Physics Instrumentation	2
	Total	**20**
	Semester 3	
UNIVUM6009	Indonesian Language	2
UNIVUM6013	Teaching and Learning	3
PFISUM6103	Fundamentals of Physics III	4
PFISUM6104	Classical Mechanics	2
PFISUM6105	Vibrations and Waves	2

Course code	Course name	credits
	Semester 2	
UNIVUM6001	Islamic Education	3
UNIVUM6012	Learner Development	3
PFISUM6102	Fundamentals of Physics II	4
PFISUM6202	Experiments on Fundamentals of Physics II	1
PFISUM6302	Mathematical Methods for Physics I	2
PFISUM6402	Applied Computer Programming	2
PFISUM6403	Experiments on Applied Computer Programming	1
PFISUM6602	Electronics I	2
PFISUM6603	Experiments on Electronics I	1
	Total	**19**
	Semester 4	
UNIVUM6008	Civics Education	2
PFISUM6106	Special Relativity Theory	2
PFISUM6107	Electromagnetism	3
PFISUM6108	Thermodynamics	2
PFISUM6205	Experiments on Electromagnetism	1

PFISUM6203	Experiments on Fundamentals of Physics III	3
PFISUM6204	Experiments on Classical Mechanics	1
PFISUM6303	Mathematical Methods for Physics II	2
PFISUM6404	Interface for Physics Education	2
PFISUM6405	Experiments on Interface for Physics Education	1
PFISUM6604	Electronics II	2
PFISUM6605	Experiments on Electronics II	1
	Total	**23**
	Semester 5	
UNIVUM6010	Innovation Management	3
PFISUM6109	Quantum Physics	2
PFISUM6110	Optics	2
PFISUM6111	Statistical Physics	2
PFISUM6206	Experiments on Optics	1
PFISUM6409	Physics Learning	3
PFISUM6410	Practices on Physics Learning	1
PFISUM6411	Research Methodology in Physics Education	3
PFISUM6505	English for Physics Teacher	2
PFISUM6607	ICT Based Teaching Physics Media	2
PFISUM6608	ICT Based Assesment	2

PFISUM6304	Mathematical Methods for Physics III	2
PFISUM6406	Physics Learning Assesment	2
PFISUM6407	Statistcs for Physics Education	2
PFISUM6408	Applied Computer Programming	2
PFISUM6502	Physics Pedagogical and Content Knowledge	3
PFISUM6503	Professional Ethic	2
PFISUM6504	Physics Characteristic of Learner Development	3
PFISUM6606	Physics Experiments and Teaching Tool Development	2
	Total	**23**
	Semester 6	
PFISUM6112	Solid State Physics	2
PFISUM6113	Atomic Physics and Molecule	2
PFISUM6114	Nuclear Physics and Particles	2
PFISUM6207	Experiments on Atomic Physics	1
PFISUM6412	Seminar on Physics Education	2
PFISUM6506	Teaching Physics in English	3
PFISUM6507	Inovative Teaching Model	2
PFISUM6508	Hybrid Learning	3
PFISUM6611	Online Teaching Physics Media	2
PFISUM6612	Teaching Material Development	2
PFISUM6703	Research and Development Design	2

PFISUM6609	Formative Assessment	2
PFISUM6610	Performance Based Assessment	2
PFISUM6701	Quantitative Research	2
PFISUM6702	Qualitative Research	2
	Total	**24**
	Semester 7	
UPLPUM6090	Real Teaching	4
UKKNUM6090	Community Services Program	4
PFISUM6613	Education Institution and Facilities Management	2
PFISUM6614	Advanced Assessment and Evaluation	2
PFISUM6705	Mixed Methods Research	2
	Total	**12**

PFISUM6704	Classroom Action Research	2
	Total	**19**
	Semester 8	
PFISUM6413	Thesis on Physics Education	6
	Total	**6**