



ASIIN Seal

Accreditation Report

Bachelor's Degree Programmes

Mathematics

Statistics

Physics

Provided by

Universitas Brawijaya, Indonesia

Version: 28 March 2023

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A About the Accreditation Process

Name of the degree programme (in original language)	(Official) English translation of the name	Labels applied for ¹	Previous accreditation (issuing agency, validity)	Involved Technical Committees (TC) ²
Program Sarjana Matematika	Bachelor programme in Mathematics	ASIIN	BAN-PT, 2025	12
Program Sarjana Statistika	Bachelor programme in Statistics	ASIIN	BAN-PT, 2024	12
Program Sarjana Fisika	Bachelor programme in Physics	ASIIN	BAN-PT, 2024	13
<p>Date of the contract: 30.03.2021</p> <p>Submission of the final version of the self-assessment report: 27.08.2021</p> <p>Date of the audit (online): 25.10. – 27.10.2021</p>				
<p>Peer panel:</p> <p>Prof. Dr. Claudia Cottin, Bielefeld University of Applied Sciences</p> <p>Prof. Dr. Sabine Le Borne, Hamburg University of Technology</p> <p>Dr. Wilhelm Kusian, Siemens AG</p> <p>Luthfia Hastifa Sam, Student at Hasanuddin University</p>				
<p>Representative of the ASIIN headquarter: Jan Philipp Engelmann</p>				
<p>Responsible decision-making committee: Accreditation Commission</p>				
<p>Criteria used:</p> <p>European Standards and Guidelines as of May 15, 2015</p> <p>ASIIN General Criteria, as of December 10, 2015</p>				

¹ ASIIN Seal for degree programmes.

² TC: Technical Committee for the following subject areas: TC 12 - Mathematics; TC 13 - Physics.

A About the Accreditation Process

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)	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
Bachelor in Mathematics	Sarjana Matematika (S.Mat.) / Bachelor of Mathematics	-	6	Full time	no	8 Semesters	144 SKS / 216 ECTS	Once a year (July)
Bachelor in Statistics	Sarjana Statistika (S.Stat.) / Bachelor of Statistics	-	6	Full time	no	8 Semesters	144 SKS / 216 ECTS	Once a year (July)
Bachelor in Physics	Sarjana Sains (S.Si.) / Bachelor of Science	-	6	Full time	no	8 Semesters	144 SKS / 216 ECTS	Once a year (July)

³ EQF = The European Qualifications Framework for lifelong learning

For the Bachelor's degree programme Mathematics, Universitas Brawijaya (UB) has presented the following profile in the Self-Assessment Report:

“Vision:

To become a superior Undergraduate Program of mathematics that can compete nationally in 2025 and internationally in 2035 in the field of applied mathematics through the process of education, research, and community service

Missions:

1. To produce graduates who capable of developing mathematics appropriately and efficiently and able to adapt to the development of science and technology,
2. Organizing a learning process which is oriented towards the development and application of Mathematics,
3. Increasing Mathematical research activities which are valuable scientifically, economically, as well as socially,
4. Socializing Mathematics, through collaboration with other institutions, research publication, and community service activity based on applied mathematics.”

For the Bachelor's degree programme Statistics, Universitas Brawijaya (UB) has presented the following profile in the Self-Assessment Report:

“Vision:

Become a centre for excellent Undergraduate Statistics education and research at the international level, in the fields of statistical computation, social humanities, economics, industry, and life science in 2025.

Mission:

1. Providing quality learning processes according to National Standards of Higher Education.
2. Equipping graduates to be able to compete and easily adapt to the world of work, as well as being ready to continue their education to a higher level.
3. Increase the quantity and improving the quality of joint research to support the development of statistics in computation, social humanities, economics, industry, and life science
4. Disseminating the application of statistics correctly.”

For the Bachelor's degree programme Physics, Universitas Brawijaya (UB) has presented the following profile in the Self-Assessment Report:

“Vision:

To be an international study program in physics and its applications on technologies in various sectors, especially in medical and environmental applications.

Missions:

- 1). Conducting an undergraduate education that meets the Indonesian Quality Framework (IQF) and the Indonesian Higher Education Standard (SNPT) and is also referred to as the competence standard set by the Indonesian Physicists Association (PSI).
- 2). Providing international research experiences in the educational program through various international research activities.
- 3). Providing entrepreneurial learning experiences that can promote community resilience in society
- 4). Supporting the vision of the Physics Department as the Center of Excellent in Medical and Environmental Applications Research and Development”

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
- Webpage Ba Mathematics: <https://matematika.ub.ac.id/s1-matematika/>
- Webpage Ba Physics: <https://fisika.ub.ac.id/>
- Webpage Ba Statistics: <https://statistika.ub.ac.id/sarjana-s1/>
- Discussions during the audit

Preliminary assessment and analysis of the peers:

The peers base their assessment of the learning outcomes as provided on the websites and in the Self-Assessment Report of the three Bachelor's degree programmes under review.

Universitas Brawijaya (UB) has described and published programme educational objectives (PEO) and intended learning outcomes (ILO) for each of the three degree programmes. While the PEO are developed based on the vision and mission of the university as well as the respective faculty and department and are rather general and concise, the ILO describe in greater detail the competences which the students should acquire during their studies. The PEO and ILO are contained in the academic handbooks of the respective departments and published on the website of the degree programmes. They are thus well-anchored and accessible for students as well as for all other stakeholders.

The peers refer to the Subject-Specific Criteria (SSC) of the Technical Committee Mathematics as a basis for judging whether the intended learning outcomes of the Bachelor's degree programmes Mathematics and Statistics as defined by UB correspond with the competences as outlined by the SSC. Concerning the Bachelor's degree programme Physics,

they take the SSC of the Technical Committee Physics as a basis for their assessment. They come to the following conclusions:

The learning outcomes of all programmes contain the general aspect that graduates should be able to think independently and critically and to work in teams. Beyond that, they encompass specific competences for each of the three programmes.

Graduates of the Bachelor's degree programme Mathematics should understand the main theoretical concepts and principles in Mathematics and should be able to use these in order to solve simple practical problems in various fields by applying mathematical methods. Moreover, they should be able to conduct basic research based on general scientific methods and to present and solve mathematical problems both orally and in writing. The programme is designed as a general mathematics programme with some specialisation during the student's final project. The graduates are to be equipped with skills required to develop and adapt to the wide spectrum of possible occupations. Consequently, graduates have a broad occupational area. Their professional profile includes occupations as researchers, teachers/lecturers, entrepreneurs, and work in industry or government. Some continue in graduate programmes, either at the university itself or at other universities in Indonesia or abroad.

The Bachelor's degree programme Statistics generally aims at qualifying graduates to analyse data. Graduates should be able to apply statistical methods in different fields such as research, industry or business. For this purpose, they should know how to use statistical software, be able to present the results of their findings, and be aware of ethical problems that have to be considered when applying statistical methods. Furthermore, they should be able to take appropriate decisions based on their data analysis. Most graduates are employed in the private sector while others work as civil servants, lecturers, teachers, or continue their studies.

The goal of the Bachelor's degree programme Physics is to impart fundamental competences in mathematics, general natural sciences, and particularly in the different areas of physics. Graduates should be able to understand, formulate and solve basic problems in physics by applying the relevant mathematical, computational, and experimental methods. They should be capable of using these methods in interdisciplinary and practical contexts. Moreover, they should be familiar with scientific methods and be able to present problems and their solutions orally and in writing. Given this broad profile, graduates are employed in many different fields, for instance in industry, in academia as lecturers or researchers, as entrepreneurs or in government agencies.

Based on the Self-Assessment Report and the discussions during the online audit, the peers see that the graduates of all programmes under review acquire the subject-specific competences defined in the SSC of the Technical Committees for Mathematics and Physics respectively, as well as general skills, which are useful for their later professional life. They are convinced that the intended qualification profiles of the programmes allow graduates to take up an occupation that corresponds to their qualification. This is confirmed by the tracer studies, which the university conducts on a regular basis and which show that graduates are usually able to find a job shortly after graduation. Graduates as well as employers consider the skills obtained during the programmes to be useful for their occupations.

The peers conclude that the objectives and intended learning outcomes of the degree programmes adequately reflect the intended level of academic qualification and correspond sufficiently with the SSC of the Technical Committees for Mathematics and Physics. The degree programmes are designed in such a way that they meet the goals set for them. The objectives and intended learning outcomes of all three degree programmes under review are reasonable and well founded.

Criterion 1.2 Name of the degree programme

Evidence:

- Self-Assessment Report

Preliminary assessment and analysis of the peers:

The auditors confirm that the English translation and the original Indonesian names of all degree programmes under review correspond with the intended aims and learning outcomes as well as the main course language (Indonesian).

Criterion 1.3 Curriculum

Evidence:

- Self-Assessment Report
- Study plans of the degree programmes
- Module descriptions
- Webpage Ba Mathematics: <https://matematika.ub.ac.id/s1-matematika/>
- Webpage Ba Physics: <https://fisika.ub.ac.id/>
- Webpage Ba Statistics: <https://statistika.ub.ac.id/sarjana-s1/>
- Discussions during the audit

Preliminary assessment and analysis of the peers:

The curricula of the degree programmes are designed to implement the programme objectives and learning outcomes and they are subject to constant revision processes (see chapters 1.1 and 6). 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 the private sector and other universities. Regular changes are made to ensure that the curricula are up to modern standards.

All programmes under review are offered by the Faculty of Mathematics and Natural Sciences. They are designed for eight semesters or four years, in which the students have to achieve at least 144 credit points (SKS), which is equivalent to approximately 216 ECTS points (see chapter 2.2 for more details). The maximum period of study is 14 semesters. Each semester is equivalent to 16 weeks of learning activities including one week for mid-term exams and one week for final exams. The odd semester starts in August and ends in January of the following year, while the even semester lasts from February to July. In addition, there is an optional short summer semester which is designed for students, who need to make up missed or failed courses.

The curriculum consists of university requirements and compulsory and elective courses determined by UB and the respective departments. University requirements are courses that need to be attended by all undergraduate students at UB. There are seven university requirements: English, Bahasa Indonesia, Religious Education, Civic Education, Entrepreneurship, Pancasila, and Community Service. These courses run in parallel to the subject-specific courses over the entire course of the programmes.

The vast majority of the courses in all degree programmes are compulsory, but all offer some room for specialisation through elective courses that can be taken from the second year of study. The peers learn that despite some common topics, the courses are generally tailored to the individual programmes. Consequently, only few courses are shared between the students in mathematics and statistics, mostly elective courses. Furthermore, all students need to complete an internship (3 SKS) and a final thesis (6 SKS).

In the Bachelor's degree programme Mathematics, the courses are designed so that the students learn the necessary basics in the different areas of mathematics, for instance algebra, calculus, geometry and probability theory. They also acquire competences in programming. Through the choice of elective modules, they can either learn more in one of the mentioned areas or obtain skills in applications of mathematical methods, for instance in finance and insurance, data mining or programming.

The curriculum of the Bachelor's degree programme Statistics covers the necessary areas of mathematics, such as probability theory, mathematical statistics and numerical analysis,

in the first semesters. Moreover, students are familiarised with the use of statistics in social and life sciences as well as non-scientific areas. In the later course of study, they learn how to gather and analyse data in practice, through courses on the design of experiments, sampling techniques, and computational methods.

The students of the Bachelor's degree programme Physics first get an overview of basic science, mathematics and fundamentals of physics needed for their studies. Over the course of the first six semesters, they take compulsory 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, the students can choose from a wide range of electives covering advanced and specialised fields of physics.

The peers see that the curricula of all three programmes are generally suitable to achieve the intended learning outcomes as defined by UB. They cover all important areas of the respective subject and allow the students to specialise to a certain degree in accordance with their interests. The documents show that most courses are lectures and that there are only few seminars or similar courses. While the peers learn that in some lectures, group discussions are held and assignments for groups are given, which are sometimes presented in class, they still think that there is some room for improvement in these areas. More interactive class formats and teaching methods could contribute to strengthening the students' soft skills with respect to communication, presentation, and team leadership. Employers and students agree that it would be useful for graduates of the three programmes to have more of these soft skills. Therefore, the peers would like UB to think about how more opportunities can be provided for the students to improve their soft skills.

Since UB has the goal to become internationally more visible and wants to further internationalise its degree programmes, the peers discuss with the programme coordinators and students if any classes in the programmes are taught in English. The programme coordinators explain that usually all courses are delivered in Indonesian language, but most of the teaching materials (textbooks, slides) are provided in English. Sometimes parts of a lecture are held in English. However, students are currently not encouraged to actively communicate in English, apart from one language course, which is compulsory for all degree programmes. The peers learn that other programmes at UB have established separate English classes, in which all courses are held in English and into which students are admitted based on an entrance test. The peers appreciate this system, as it allows the university to attract more international students and at the same time the Indonesian students can actively improve their English skills. Therefore, they recommend that the university teach more courses in English in the programmes under review or that dedicated international classes are introduced.

Overall, the peers gain the impression that the curricula of all three programmes are reasonably structured and contribute to the achievement of the intended learning outcomes. In their assessment, graduates are well prepared for entering the labour market and can find adequate jobs in Indonesia.

Criterion 1.4 Admission requirements

Evidence:

- Self-Assessment Reports
- Decree of Minister of Research, Technology and Higher Education No. 2, 2015
- UB webpage: <https://www.ub.ac.id/admission>
- Discussions during the audit

Preliminary assessment and analysis of the peers:

According to the Self-Assessment Report, admission procedures and policies for new students follow the National Regulation No. 2, 2015. The requirements, schedule, registration venue, and selection test are announced on UB's webpage and thus accessible for all stakeholders.

There are three different ways by which students can be admitted to a Bachelor's programme at UB:

1. National Entrance Selection of State Universities (Seleksi Nasional Masuk Perguruan Tinggi Negeri, SNMPTN), a national admission system, which is based on the academic performance during the high school (30 % of the students at UB are admitted through this selection system).
2. Joint Entrance Selection of State Universities (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). It accounts for 40 % of the admitted students at UB.
3. Independent Selection (Seleksi Mandiri). Students are selected based on a written test (similar to SBMPTN) specifically held by UB for prospective students that have not been accepted through SNMPTN or SBMPTN (30 % of the students at UB are admitted through this test).

The number of applicants exceeds by far the number of available places. From 2017 to 2020, there were between 1300 and 2700 students applying for admission to the Mathe-

mathematics programme per year and only 135 to 218 new students were accepted. This is equivalent to an admission rate of 6-15 %. For Physics, from 2017 to 2020, there were around 750 to 950 students applying for admission per year, of which only 115 to 141 were accepted (around 14 %). Admission into the Statistics programme is even more competitive. From 2018 to 2020 an average of 3300 students applied for admission, of whom 151 to 216 were admitted. This is equivalent to an admission rate of only 6 %.

For undergraduate students from the routes of SNMPTN or SBMPTN (via national selection exams), the maximum tuition fee is Rp 5,300,000 (~EUR 322.67) per semester. For undergraduate students from the routes of independent selection (Seleksi Mandiri), the tuition fee is slightly higher.

Approximately 15 % of all undergraduate students at UB are fully funded by the government including their daily expenditures. A tuition waiver scheme is available upon request and the amount depends on the parents' economic status. The amount of waiver ranges from 20 to 100 % of the total fee.

The peers inquire of the programme coordinators why there are so many students applying for studying at UB. They learn that mathematics, statistics and physics are popular subjects because the job perspectives are very good. In addition, there are many high school graduates in Indonesia and UB is one of the most prestigious universities in the country. Consequently, UB only accepts the best candidates. From their discussion with the students, the peers gain the impression that the admission system is effective and only very motivated and high-performing candidates are admitted. The peers consider the highly selected and motivated students to be one of the strong points of the three undergraduate programmes under review.

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

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

The peers thank UB for their plans to work on the students' soft skills as well as on strengthening the use of English within the programmes and encourage the university to pursue these further.

They consider criterion 1 fulfilled.

2. The degree programme: structures, methods, and implementation

Criterion 2.1 Structure and modules

Evidence:

- Self-Assessment Reports
- Study plans of the degree programmes
- Module descriptions
- Academic handbooks
- Discussions during the audit

Preliminary assessment and analysis of the peers:

The curricula of all three Bachelor's degree programmes under review are designed for eight semesters. Average students take 18 credits in every semester, while outstanding students may take up to 24 credits. Therefore, outstanding students are able to complete the Bachelor's degree in less than 4 years. However, this case is rare since the workload of the undergraduate programmes is rather high and the curricula are designed for four years. The students' individual study plans can be different from each other but have to be approved by their academic advisors. The curricula include theoretical and practical courses, thesis, community service, and electives.

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 allow the students to define individual focuses through broad ranges of electives (see the lists of electives in the appendix). The peers learn that an elective course is offered as soon as at least five students have registered for it. Given the overall number of students in the programmes, this ensures that the students have many options.

The students confirm that the structure of the programme allows them to reach the learning outcomes within the regular duration. This is corroborated by data provided by UB, which demonstrates that the average study time is very close to the allocated eight and four semesters for Bachelor's and Master's degree programmes, respectively. At the same time, only very few students do not successfully finish their studies in the programmes at hand. In the peers' opinion, this shows the sound organisation of the programmes as well as sufficient means of support for the students (see chapter 2.4).

Based on the module handbooks and the discussions with teachers and students, the peers are not sure whether the amount of credit points awarded for each course always reflects the students' actual workload, particularly with regards to students' individual learning and studying. The students are generally happy with their workload. However, the peers think there may be too few credit points awarded for some courses in relation to the workload. This especially concerns the thesis, for which 6 SKS (around 10 ECTS points) are awarded and for which the students typically work around six months. The peers do not see this as an urgent problem but would like UB to systematically check the students' workload in the individual courses to ensure that it fits the awarded credit points (see chapter 2.2).

The peers discuss the mandatory internship (field practice) with students as well as partners from industry and business. While they agree that the internship is well organised and that there is sufficient support for students in finding a position, they stress that the current length of the internship (four weeks) is quite short. Employers would like students to spend more time in the companies, so that they are both more useful for the companies and obtain more practical skills. Therefore, the peers suggest that UB evaluate the current length of the internship to ensure that it provides the students with significant experience of the labour market. Otherwise, UB's partners are very satisfied with the qualification profile of the graduates of all three programmes under review.

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.

International Mobility

UB provides opportunities for students to conduct internships and exchange programmes abroad. A list of available exchange and internship programmes that students can participate in is available at UB's International Relation Office. For example, international cooperations with more than 40 different universities and Institutes, in countries such as Australia, Japan, South Korea, Thailand, Germany, USA, Turkey, Netherlands, and New Zealand exist. Student exchange activities are aimed at enhancing students' international insights through learning exchange programmes and interacting across cultures. The peers recognise and appreciate that the degree programmes under review made some efforts to reduce the number of compulsory courses in the sixth and seventh semesters so that it is easier for students to go abroad without prolonging their studies.

The new policy of the Indonesian government actively supports any activities outside of the university by releasing a regulation on the Merdeka Belajar-Kampus Merdeka (MBKM), which requires the university to promote students who want to pursue activities and acquire credits outside their Bachelor's programme for up to three semesters (Minister of

Education and Culture Regulation Number 3 Year 2020). UB recognizes the courses taken by the students outside the university based on the equality of the intended learning outcomes. The peers consider this regulation sufficient. However, according to the opinion of the peer group, the academic mobility of the students should be further promoted. The number of Bachelor students who participate in international exchange programmes is still low despite students' high interest.

The students confirm during the discussion with the peers that some opportunities for international academic mobility exist. However, they also point out that they wish for better information, more places, and better endowed scholarships for long- and short-term stays abroad. The number of available places in the exchange programmes is still limited and there are restrictions due to a lack of sufficient financial support. UB can only provide limited travel grants while the demand from students is rising. The lack of financial support hinders students from joining the outgoing programmes.

Based on this feedback, the peers recommend increasing the effort to further internationalise UB by establishing more international collaborations and exchange programmes and by offering more and better-endowed scholarships. In addition, the peers see that many of the faculty members have international contacts which can be used as a starting point for additional collaborations. It is also possible for students and teachers to apply for international funding for stays abroad offered through ERASMUS+ or by the German Academic Exchange Council (DAAD).

In summary, the peers appreciate the efforts to foster international mobility and support the university in further pursuing this path.

Criterion 2.2 Workload and credits

Evidence:

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

Preliminary assessment and analysis of the peers:

Based on the National Standards for Higher Education of Indonesia (SNPT), all three undergraduate programmes under review use a credit point system called SKS. The minimum workload of an undergraduate programme in UB is 144 SKS, which corresponds to 6.528

academic hours or 216 ECTS (calculating with 30 hours per ECTS). The normal workload of each regular semester is 816 hours, which corresponds to 18 SKS (27 ECTS).

To complete the degree programme in time, Bachelor students need to take an average of 18 SKS per semester. However, the regular schedule usually covers 20-21 SKS per semester to give more space in the last semesters for finishing earlier, resits, or pursuing extra-curricular activities. If a student is not satisfied with his/her GPA, she or he can repeat the classes, but this will lead to a prolongation of the study time.

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. For seminars and practical work, it is 100 minutes in class and 70 minutes of independent learning, whereas for thesis and internship, 1 SKS equals 170 minutes of the respective activity per semester week.

As has already been mentioned, based on the available data, most of the students manage to finish their studies on time. The students confirm that the overall workload is high but manageable. As the lecturers explain, the workload for assignments and individual study in each course is estimated by the lecturers based on their experience. There is, however, currently no mechanism in place to ensure that this estimated workload is realistic and to prevent students from having to invest disproportional effort into certain courses. The peers suspect that the workload in some courses, particularly for the thesis, may be higher than the amount of credit points would justify. Thus, they recommend establishing a system to monitor the actual student workload in the individual courses. This could, for instance, be incorporated into the existing course evaluation surveys. If any imbalances are found, the amount of credit points for the respective courses would have to be adjusted accordingly.

Criterion 2.3 Teaching methodology

Evidence:

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

Preliminary assessment and analysis of the peers:

Various teaching and learning methods (including lectures, computer training, laboratory and classroom exercises, individual and group assignments, seminars, and projects, etc.)

have been implemented. Structured activities include tutorials, homework, assignments (reading or problem exercises), and practical activities. Group project assignments are given in some courses to develop students' skills in teamwork, communication, and leadership. The assignments and exercises should help students to develop their abilities with respect to critical thinking, written/oral communication, data acquisition, problem solving, and presentations.

UB has the goal to support the transition from a teacher-centred to a student-oriented and outcome-based education (OBE) in order to involve all students in the learning process and to develop their thinking and analytical skills.

The most common method of learning is class session. Lecturers generally prepare presentations to aid the teaching process. With individual or group assignments, such as discussions, presentations, or written tasks, students are expected to improve their academic as well as their soft skills. In addition, practical activities should enable students to be acquainted with academic research methods.

The peers appreciate these goals but think that there is still some room for improvement regarding the practical implementation. Since students and employers mentioned that soft skills such as communication, presentation and team leadership could be fostered in a better way (see chapter 1.3), the peers would like UB to think about how more opportunities can be provided for the students to improve their soft skills. This could be done by adding more group work, for instance in small projects that are presented afterwards or through other appropriate means.

To help students achieving the intended learning outcomes and to facilitate adequate learning and teaching methods, UB has developed an e-learning platform where students and teachers can interact.

In summary, despite the mentioned room for improvement, the peer group considers the teaching methods and instruments to be suitable to support the students in achieving the intended learning outcomes. In addition, they confirm that the study concept of all three undergraduate programmes comprises a variety of teaching and learning forms as well as practical parts that are adapted to the respective subject culture and study format. It actively involves students in the design of teaching and learning processes.

Criterion 2.4 Support and assistance

Evidence:

- Self-Assessment Report
- Academic handbooks

- Discussions during the audit

Preliminary assessment and analysis of the peers:

UB offers a comprehensive advisory system for all undergraduate students. At the start of the first semester, every student is assigned to an academic advisor. Each academic advisor is a member of the academic staff and is responsible for 5 to 15 students from his classes. He/she is a student's first port of call for advice or support on academic or personal matters.

The role of the academic advisor is to help the students with the process of orientation during the first semesters, the introduction to academic life and the university's community, and to respond promptly to any questions. They also offer general academic advice, make suggestions regarding relevant careers and skill development and help if there are problems with other teachers. The students confirm during the discussion with the peers that they all have an academic advisor. In general, students stress that the teachers are open minded, communicate well with them, take their opinions and suggestions into account, and changes are implemented if necessary.

The fourth-year students who prepare their final project have one or more supervisors who are selected based on the topic of the final project. One supervisor could be an external supervisor if the student performs the research outside UB. The role of the final project supervisors is to guide students in accomplishing their final project, e.g., to finish their research and complete the final project report.

UB has established the Center for Disability Studies and Services (PSLD UB) in 2012, which functions as a research centre on disability issues and the provision of services for people with disabilities at UB. The establishment was motivated by the low number of people with disabilities that are enrolled in higher education in Indonesia. Due to the limited access to higher education for persons with disabilities, less than one percent of persons with disabilities have an undergraduate degree. In Indonesia, the education model for persons with disabilities is still separated, namely by providing special education through special schools or boarding schools. This model separates people with disabilities from non-disabled people in different environments, so that after the completion of the study period, people with disabilities are still not ready to blend in with the environment. Access to higher education is also difficult for persons with disabilities because of the requirement to enter higher education with "no disability". This also happened at UB, where previously there was no infrastructure which could be accessed by people with disabilities. This has changed with the establishment of PSLD UB and now students with disabilities are accepted in all programmes at UB and can access the facilities.

Finally, there are several student organizations at UB; they include students' activity clubs, which are divided into arts, sports, religious and other non-curricular activities.

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

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

The peers thank UB for its comments and explanations on the internship programmes, internationalization, and student workload. They appreciate that the university has decided to increase the workload of the internship from 3 to 4 SKS and thereby consider the issue settled.

Furthermore, they acknowledge that the university takes into account the student workload in the curriculum revision processes, but they still consider it worthwhile to evaluate the workload associated with the final thesis in particular. University regulations should not prevent the study programmes from allocating a number of credit points that adequately covers the effective workload of the students.

The peers consider criterion 2 fulfilled.

3. Exams: System, concept, and organisation

Criterion 3 Exams: System, concept and organisation
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Evidence:

- Self-Assessment Reports
- Module descriptions
- Academic handbooks
- UB Academic Calendar

Preliminary assessment and analysis of the peers:

According to the Self-Assessment Reports, the students' academic performance is evaluated based on their attendance and participation in class, assignments, homework, presentations, mid-term exam, and the final exam at the end of each semester. The form and

length of each exam is mentioned in the module descriptions that are available to the students via UB's homepage and the digital platform SI-AM.

The most common type of evaluation used are written examinations; however, quizzes, assignments (small projects, reports, etc.), laboratory reports, presentations, seminars, and discussions may contribute to the final grade. Written examinations, either closed-book or open-book, typically include short answers, essays, problem-solving or case-based questions, and calculation problems. Some lecturers also give multiple choice or true-false questions in examinations or quizzes. Students are informed about mid-term and final exams via the Academic Calendar. They confirm that there are no unscheduled quizzes or tests. The final grade is the result of the different activities in the course (e.g., mid-term exam, final exam, quizzes, or other given assignments).

Students must write a report about their internship, which will be evaluated by the responsible teacher at UB using an internship rubric. Students are also obliged to present the results of their internship and share their experience.

If a student fails, she or he usually has to repeat the entire module in the following year; it is usually not possible to retake just parts of the course or to just retake the final exam. However, lecturers need to arrange examinations for students who have not taken the examinations due to valid reasons. Some courses allow students whose grades are still below the passing level to improve their grades through repeating an exam.

The peers discuss with the students how many and what kind of exams they have to take each semester. They learn that for each course there is one mid-term exam and one final exam in every semester. Usually, there are additional practical assignments or small tests. The final grade is the sum of the sub-exams. The students confirm that they are well informed about the examination schedule, the examination form, and the rules for grading. Although students say that they usually have enough time for preparing the exams, what remains unclear to the peers is whether there is a gap week without any courses before the final or mid-term exams to give the students more preparation time. The peers received contradictory information on this point during the audit and would therefore like UB to clarify this.

Every student in the three undergraduate programmes under review is required to do a final project (Bachelor's thesis). This project is conducted independently under the guidance of one or more supervisors and usually consists of literature study, practical research, and data analysis. Both the student and his /her supervisors might decide the topic and content of the project. In many cases, the lecturers offer particular topics connected to their research. The final thesis is presented in front of a group of examiners in seminar format. The examiners consist of the respective supervisors and at least two other lecturers

from the faculty (or assigned institutions). It is also possible to conduct an external final project, e.g., in cooperation with a company. In this case, one co-supervisor comes from the respective company.

Overall, the peers are satisfied with the regulation of exams in the degree programmes. They also inspect a sample of examination papers and Bachelor's theses and are satisfied with their general quality.

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

UB explains that there usually is a gap week between classes and final exams, but that it could not be implemented in 2020 and 2021 due to the challenges of the Covid-19 pandemic. The peers appreciate this structure that enables students and lecturers to better prepare the exams and they are pleased to learn that the gap week has been re-established for the academic year 2021/22.

They consider criterion 3 fulfilled.

4. Resources

Criterion 4.1 Staff

Evidence:

- Self-Assessment Reports
- Staff handbooks
- Study plans
- Module descriptions
- Discussions during the audit

Preliminary assessment and analysis of the peers:

At UB, the staff members have different academic positions. There are professors, associate professors, assistant professors, and instructors. The academic position of each staff member is based on research activities, publications, academic education, supervision of students, and other supporting activities. For example, a full professor needs to hold a PhD degree. In addition, the responsibilities and tasks of a staff member with respect to teaching, research, and supervision partly depend on the academic position.

According to the Self-Assessment Report, the teaching staff at the mathematics department consists of 28 full-time teachers (18 with a PhD, 10 with a Master's degree) who are

supported by two technicians. At the statistics department, there are 22 full-time teachers (15 with a PhD, 7 with a Master's degree), and one technician. At the physics department, there are 37 full time teachers (25 with a PhD, 12 with a Master's degree), supported by 4 laboratory technicians. The current teacher to student ratio for physics is 1:9, for Mathematics 1:18 and for Statistics 1:23, which are all good ratios by international standards. Student and teachers confirm that particularly for the physics programme, there are enough laboratory technicians to look after the technical equipment and to support the students in their practical work.

All fulltime members of the teaching staff are obliged to be involved in (1) teaching/advising, (2) research, and (3) community service. However, the workload can be distributed differently between the three areas from teacher to teacher.

Most of the teachers have graduated from universities outside of UB. Several hold a PhD from overseas or are currently pursuing a PhD overseas. The peers appreciate this international background.

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 Reports
- Staff handbook
- Discussions during the audit

Preliminary assessment and analysis of the peers:

UB encourages training of its academic and technical staff for improving the didactic abilities and teaching methods. As described in the Self-Assessment Reports, faculty members and non-academic staff regularly participate in training or workshops. Every year, the heads of departments and study programmes map the competences of their staff, analyse organisational needs for continuous improvement, and make plans for annual work programmes in line with the faculty's and university's strategic plans.

To this end, UB has established several programmes to support staff development. New staff members are required to undertake an intensive basic training programme called Pre-Service or Pra-Jabatan. Following Pra-Jabatan, lecturers are required to undertake Training for the Development of Basic Skills in Instructional Techniques (PEKERTI) and Applied Approach (AA) to develop teaching and management skills. In addition, lecturers are required

to take a lecturer certification and obtain an educator certificate (SERDOS) that shows their recognition as a professional staff. In addition, lecturers are mentored by their seniors to develop their expertise and to advance their career. Finally, UB provides awards for high performing and high achieving staffs, such as the Governance, Innovation, Reputation, Alumni, Faculty, Fund, and Efficiency (GIRAFFE) Award.

Faculty members can also further develop their competencies through several activities such as post-doctoral programmes, workshops, joint research, etc. Moreover, they are encouraged to present their research papers in national and international conferences, and to collaborate with colleagues from international universities.

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 UB, their opportunities to further improve their didactic abilities and to spend some time abroad to attend conferences, workshops, or seminars.

In summary, the auditors confirm that UB offers sufficient support mechanisms and opportunities for members of the teaching staff who wish to further develop their professional and teaching skills.

Criterion 4.3 Funds and equipment

Evidence:

- Self-Assessment Reports
- Video of the facilities
- Discussions during the audit

Preliminary assessment and analysis of the peers:

Basic funding of the undergraduate programmes and the facilities is provided by UB and by the Faculty of Mathematics and Natural Sciences. Additional funds for research activities can be provided by UB or the Indonesian government, but the teachers have to apply for them in a competitive manner.

The provided budget allows the departments to conduct the study programmes as well as some specific activities, including student exchange programmes, student financial assistance for research, and participation in international conferences.

The programme coordinators emphasise that from their point of view, all three undergraduate programmes receive sufficient funding for teaching and learning activities. Hence, the departments do not face any financial shortages. Of course, there is limited funding to modernise or add laboratory equipment, but there are sufficient resources for adequately teaching the classes.

From the provided documents and videos of the laboratories, the peers deduct that there are no severe bottlenecks due to missing equipment or lacking infrastructure. The necessary technical equipment for teaching and research is available. The students confirm during the discussion with the peers that they are satisfied with the available equipment. Moreover, the peers learn during the audit that students can use and operate the instruments in the laboratories by themselves after being trained and instructed by lab technicians. Each laboratory has a lab supervisor; in addition, there are several senior students, who work as lab assistants. UB also has a central laboratory where more sophisticated instruments are available and lab technicians are present to operate them.

Each department has a computer laboratory that students can use for studying. On request, they are also granted access to high-performance computers, which may be needed for their final projects.

The students also express their satisfaction with the library and the available literature there. The library has subscribed to several international databases such as Springer Nature, ProQuest or JSTOR.

In summary, the peer group judges the available funds, the technical equipment, and the infrastructure (laboratories, library, seminar rooms etc.) to comply with the requirements for an adequately sustainability of the degree programmes.

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

The peers consider criterion 4 fulfilled.

5. Transparency and documentation

Criterion 5.1 Module descriptions

Evidence:

- Self-Assessment Report
- Module descriptions
- Webpage Ba Mathematics: <https://matematika.ub.ac.id/s1-matematika/>
- Webpage Ba Physics: <https://fisika.ub.ac.id/>
- Webpage Ba Statistics: <https://statistika.ub.ac.id/sarjana-s1/>

Preliminary assessment and analysis of the peers:

The module handbooks for all 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 on all important issues, that is, responsible persons, the intended learning outcomes, the credit points awarded, the workload, the main content, prerequisites, examinations, and recommended literature.

Criterion 5.2 Diploma and Diploma Supplement

Evidence:

- Self-Assessment Reports
- Sample Diploma 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 three 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 including acquired soft skills and awards (extracurricular and co-curricular activities). The Transcript of Records lists all the courses that the graduate has completed, the achieved credits, grades, and cumulative GPA.

Criterion 5.3 Relevant rules

Evidence:

- Self-Assessment Reports
- All relevant regulations as published on the university's webpage

Preliminary assessment and analysis of the peers:

The peers confirm that the rights and duties of both UB and the students are clearly defined and binding. All rules and regulations are published on the university's Indonesian website 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 consider criterion 5 fulfilled.

6. Quality management: quality assessment and development

Evidence:

- Self-Assessment Reports
- Academic handbooks
- Discussions during the audit

Preliminary assessment and analysis of the peers:

The peers discuss the quality management system at UB with the programme coordinators and the students. They learn that there is a continuous process to improve the quality of the degree programmes and it is carried out through internal and external quality assurance.

There are three levels of internal quality assurance implementation. At the university level, it is conducted by the Quality Assurance Centre (Pusat Jaminan Mutu, PJM), at the faculty level, it is conducted by the Quality Assurance Group (Gugus Jaminan Mutu, GJM), and at the department level it is conducted by the Quality Assurance Unit (Unit Jaminan Mutu, UJM). At the end of every year, PJM conducts internal audits for all Bachelor's degree programmes. During this process, the programme coordinators assess the quality of all learning and teaching procedures based on the KPIs set by PJM. From these evaluations, room for improvement is identified. The heads of departments lead a meeting to evaluate teaching and learning processes within every department once each semester. In the meeting, availability of supporting resources, i.e., laboratory equipment, teaching methods, and administration services are discussed. At faculty level, a coordination meeting is conducted every semester to evaluate teaching and learning processes and supporting resources.

Internal evaluation of the quality of the degree programmes is mainly provided through student surveys. The students give their feedback on the courses by filling out the questionnaires online. Giving feedback on the classes is compulsory for the students; otherwise, they cannot access their account on UB's digital platform. The questionnaires are used to monitor and evaluate the learning processes and are distributed every semester to the lecturers before the final exam. A summary of the students' feedback is sent to the respective lecturers. Based on the results, the head of the degree programmes and the teachers reassess every course, and possibly some changes are made. If there is negative feedback, the department head invites the concerned teacher to discuss about his or her teaching methods and thus, they are expected to enhance their performance in the future.

Finally, students also have the opportunity to give feedback via the suggestion box. The community inside and outside of the university can give online feedback to the university, faculty, and department through UB-care, which can be openly accessed.

The peers gain the impression that the departments take the students' feedback seriously and that changes are made if necessary. Nevertheless, the peers see that the results of the course questionnaires are not discussed with the students. Consequently, the peers expect UB to inform students about the results of the questionnaires and the teachers should discuss with them about possible improvements in the respective course. The feedback loops need to be closed.

Moreover, students confirm during the audit that they are not represented in the university's boards and thus are not directly involved in the decision-making processes. The peers are convinced that it would be very useful to have student members in the different boards. For this reason, they recommend that student representatives should be members of boards at UB (at least on programme and faculty level) and be actively involved in the decision-making processes for further developing the degree programmes.

UB regularly conducts an alumni tracer study. By taking part in this survey, alumni can comment on their educational experience at UB, the waiting period for employment after graduation, their professional career, and they can give suggestions on how to improve the programme. Moreover, the employers are asked to give feedback to UB on employability and acquired competencies of UB's graduates. During the audit, the employers express their general satisfaction with the qualification profile.

External quality assurance focuses on both national and international accreditations. National accreditation is conducted by the National Accreditation Board for Higher Education (BAN-PT), under the Ministry of Education and Culture, Republic of Indonesia. National accreditation of the programme within the university is a legal obligation for every study programme.

The peers discuss with the representatives of UB's partners from public institutions and private companies if there are regular meetings with the partners on faculty or department level where they discuss the needs and requirements of the employers and possible changes to the degree programmes. They learn that there are curriculum boards for the programmes in which internal as well as external stakeholders are invited to give their feedback on the content of the degree programmes which the peers appreciate.

In summary, the peer group confirms that the quality management system at UB is, besides the mentioned deficits, suitable to identify weaknesses and to improve the degree programmes.

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

UB explains that the results of the course surveys are currently presented by the lecturers at the beginning of the same course in the next year. The peers appreciate this but emphasize that both the results and the measures taken to improve the courses must be communicated directly to those students that completed the respective survey. This will also raise the awareness among students for how important it is to give constructive feedback. How exactly the results and measures are communicated is at the discretion of the university.

The peers welcome that UB has already included a student representative in the board of trustees at university level, but they still recommend to include students in the decision-making bodies at lower levels (faculty, department).

They consider criterion 6 partly fulfilled.

D Additional Documents

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

1. Is there a gap week without courses before either the final or the mid-term exams?

E Comment of the Higher Education Institution (19.01.2022)

The following quotes the comment of the institution:

Criterion	Peer's Report	Feedback from The Study Programmes
Criterion 1.1 Objectives and learning outcomes of a degree programme (intended qualifications profile) (p. 10)	The peers conclude that the objectives and intended learning outcomes of the degree programmes adequately reflect the intended level of academic qualification and correspond sufficiently with the SSC of the Technical Committees for Mathematics and Physics. The degree programmes are designed in such a way that they meet the goals set for them. The objectives and intended learning outcomes of all three degree programmes under review are reasonable and well founded.	We thank the peers for positive comments on this point As the policy of UB, we evaluate and update the objectives and intended learning outcome periodically to satisfy the need of stakeholders and to adapt the development of science and technology, but still maintain the level of academic qualification.
Criterion 1.2 Name of the degree programme (p. 10)	The auditors confirm that the English translation and the original Indonesian names of all degree programmes under review correspond with the intended aims and learning outcomes as well as the main course language (Indonesian).	We appreciate the peers for positive comments on this point
Criterion 1.3 Curriculum (p. 12)	The peers see that the curricula of all three programmes are generally suitable to achieve the intended learning outcomes as defined by UB Employers and students agree that it would be useful for graduates of the three programmes to have more of these soft skills. Therefore, the peers would like UB to think about how more opportunities can be provided for the students to improve their soft skills.	In order to improve the soft skills of students, the study program in under the coordination of the Faculty of Mathematics and Natural Science regularly holds entrepreneurship, leadership, journalism and other trainings. In accordance with the MBKM program set by the ministry, since the academic year of 2020-2021, UB has set "the number of team-based and case methods" as one of the main performance indicators of the teaching learning method in a study program. Through this learning method, students improve

		their ability to work in teams, and to communicate ideas in writing and orally.
Criterion 1.3 Curriculum (p. 12)	Since UB has the goal to become internationally more visible and wants to further internationalise its degree programmes, the peers discuss with the programme coordinators and students if any classes in the programmes are taught in English. ... However, students are currently not encouraged to actively communicate in English, apart from one language course, which is compulsory for all degree programmes.	We are very happy with the suggestions from the peers. Nevertheless, we must ensure that the use of English does not reduce the level of student understanding of the lecture material. In this point, we plan to (1) conduct bilingual teaching (English- Indonesian) for several courses, (2) improve research activities including presenting results in English both written and spoken, (3) conduct English Day in several laboratories.
Criterion 1.3 Curriculum (p. 13)	Overall, the peers gain the impression that the curricula of all three programmes are reasonably structured and contribute to the achievement of the intended learning outcomes. In their assessment, graduates are well prepared for entering the labour market and can find adequate jobs in Indonesia.	We are pleased with the peers' opinion for this issue As a good practices, the curricula has been reviewed periodically together with the process of evaluation and updating of the objectives and intended learning outcome.
Criterion 1.4 Admission requirements (p. 14)	The peers inquire of the programme coordinators why Consequently, UB only accepts the best candidates. From their discussion with the students, the peers gain the impression that the admission system is effective and only very motivated and high-performing candidates are admitted. The peers consider the highly selected and motivated students to be one of the strong points of the three undergraduate programmes under review. In summary, the peers find the terms of admission to be binding and transparent. They confirm that the admission requirements support the students in achieving the intended learning outcomes.	We thank the peers for a positive comment at this points.

<p>Criterion 2.1 Structure and modules (p. 16)</p>	<p>Based on the module handbooks and the discussions with teachers and students, the peers are not sure whether the amount of credit points awarded for each course always reflects the students' actual workload, particularly with regards to students' individual learning and studying. The students are generally happy with their workload. However, the peers think there may be too few credit points awarded for some courses in relation to the workload. This especially concerns the thesis, for which 6 SKS (around 10 ECTS points) are awarded and for which the students typically work around six months.</p>	<p>In general, the number of SKS for a course is adjusted to the student's workload in understanding the Course Learning Outcome (CLO). Thus, the number of SKS must be adjusted if the number or depth of topics changes.</p> <p>Particularly, the thesis workload refers to UB Regulation Number 1 year 2017 concerning Quality Standards of Universitas Brawijaya (attached document), where Article 16 paragraph 3.a and Article 30 paragraph 1.a.1 stating that the maximum workload for thesis is 6 SKS (equivalent to 9 ECTS).</p> <p>Basically, the number of 6 credits for thesis has been in accordance with the 6th qualification level of KKNi (Indonesian Qualification Framework for undergraduate program). The 6 credits is considered adequate since thesis has been supported by several courses including Writing and Research Methodology (2 SKS) and several topics in Capita Selecta (2 SKS each).</p>
<p>Criterion 2.1 Structure and modules (p. 16)</p>	<p>Employers would like students to spend more time in the companies, so that they are both more useful for the companies and obtain more practical skills. Therefore, the peers suggest that UB evaluate the current length of the internship to ensure that it provides the students with significant experience of the labour market.</p>	<p>As stated in the SAR, the workload of field work as mandatory internship is 3 SKS (equivalent to 4.5 ECTS).</p> <p>In order to enable students to spend more time in the company and gain more practical skills, the workload is increased to 4 credits. This rule applies to students of class 2020, so the industry doesn't know about it yet.</p> <p>Furthermore, the study program always encourages and facilitates students to take part in internships in the industry through the Merdeka Belajar-Kampus Merdeka (MBKM) program. This program allows students to spend</p>

		<p>their time up to one semester at the company, where their activities are recognized as equivalent to 20 SKS.</p>
<p>Criterion 2.1 Structure and modules (p. 17)</p>	<p>Based on this feedback, the peers recommend increasing the effort to further internationalise UB by establishing more international collaborations and exchange programmes and by offering more and better-endowed scholarships. In addition, the peers see that many of the faculty members have international contacts which can be used as a starting point for additional collaborations. It is also possible for students and teachers to apply for international funding for stays abroad offered through ERASMUS+ or by the German Academic Exchange Council (DAAD).</p> <p>In summary, the peers appreciate the efforts to foster international mobility and support the university in further pursuing this path.</p>	<p>Study Programmes and Faculty (through International Relation Office, IRO) always encourage students to stay abroad for example through the IISMA (Indonesian International Student Mobility Award, a part of MBKM program held by the Ministry of Education, Culture, Research and Technology), EAS-MUS+, or DAAD. Unfortunately, this opportunity is more often used by alumni for further studies</p> <p>Currently Study Program has appointed supervisors to accompany students who take part in international funding competitions. In order to increase student mobility, Study Program under the coordination with students' affairs at the faculty level plans to hold a student coaching workshop to meet some requirements for staying abroad.</p>

<p>Criterion 2.2 Workload and credits (p. 18)</p>	<p>As has already been mentioned, based on the available data, most of the students manage to finish their studies on time. The students confirm that the overall workload is high but manageable. As the lecturers explain, the workload for assignments and individual study in each course is estimated by the lecturers based on their experience. There is, however, currently no mechanism in place to ensure that this estimated workload is realistic and to prevent students from having to invest disproportional effort into certain courses. The peers suspect that the workload in some courses, particularly for the thesis, may be higher than the amount of credit points would justify. Thus, they recommend establishing a system to monitor the actual student workload in the individual courses. This could, for instance, be incorporated into the existing course evaluation surveys. If any imbalances are found, the amount of credit points for the respective courses would have to be adjusted accordingly.</p>	<p>As previously stated, the number of credits for a course is adjusted to the estimated time needed by students in completing courses. During the orientation period at the beginning of the lecture, students have also been informed about the meaning of the credit system, especially the workload of 1 SKS.</p> <p>To ensure that student's workload meet the credit workload, this issue will be considered in the curriculum evaluation process conducted annually.</p> <p>The curriculum team may conduct a suitability analysis of student workloads in the form of a questionnaire or measurement matrix. In addition, lecturers are directed to allocate specific time for each assessment according to the appropriate credits.</p>
<p>Criterion 2.3 Teaching methodology (p. 19)</p>	<p>In summary, despite the mentioned room for improvement, the peer group considers the teaching methods and instruments to be suitable to support the students in achieving the intended learning outcomes. In addition, they confirm that the study concept of all three undergraduate programmes comprises a variety of teaching and learning forms as well as practical parts that are adapted to the respective subject culture and study format. It actively involves students in the design of teaching and learning processes.</p>	<p>We are grateful for the positive comments from the peers. As already informed in the previous point, UB encourages Study Programme to implement team-based and case methods.</p>
<p>Criterion 2.4 Support and assistance (p. 21)</p>	<p>The peers notice the good and trustful relationship between the students and the teaching staff; there are enough resources available to provide individual assistance, advice, and support for all students. The support system helps the students to achieve the intended learning outcomes and to complete their studies successfully and without delay. The students are well informed about the services available to them.</p>	<p>We appreciate the positive comments from the peers for this point.</p>

<p>Criterion 3 Exams: System, concept and organisation (p. 22)</p>	<p>Although students say that they usually have enough time for preparing the exams, what remains unclear to the peers is whether there is a gap week without any courses before the final or mid-term exams to give the students more preparation time. The peers received contradictory information on this point during the audit and would therefore like UB to clarify this.</p>	<p>In principle, UB applies gap week before the final exam, except during the pandemic. This is the explanation of the different responses between students and alumni to this point. This issue will be discussed in more details later, in Point D (Additional documents) in the end of Peer reports.</p>
<p>Criterion 3 Exams: System, concept and organisation (p. 22)</p>	<p>Overall, the peers are satisfied with the regulation of exams in the degree programmes. They also inspect a sample of examination papers and Bachelor's theses and are satisfied with their general quality.</p>	<p>We are grateful for the positive comments from the peers for this point.</p>
<p>Criterion 4.1 Staff (p. 24)</p>	<p>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.</p>	<p>We are grateful for the positive comments from the peers for this point.</p>
<p>Criterion 4.2 Staff development (p. 25)</p>	<p>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 UB, their opportunities to further improve their didactic abilities and to spend some time abroad to attend conferences, workshops, or seminars. In summary, the auditors confirm that UB offers sufficient support mechanisms and opportunities for members of the teaching staff who wish to further develop their professional and teaching skills.</p>	<p>We are grateful for the positive comments from the peers for this point.</p>
<p>Criterion 4.3 Funds and equipment (p. 26)</p>	<p>In summary, the peer group judges the available funds, the technical equipment, and the infrastructure (laboratories, library, seminar rooms etc.) to comply with the requirements for an adequately sustainability of the degree programmes.</p>	<p>We are grateful for the positive comments from the peers for this point.</p>

<p>Criterion 5.1 Module descriptions (p. 26)</p>	<p>The module handbooks for all 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 on all important issues, that is, responsible persons, the intended learning outcomes, the credit points awarded, the workload, the main content, prerequisites, examinations, and recommended literature.</p>	<p>We are grateful for the positive comments from the peers for this point.</p>
<p>Criterion 5.2 Diploma and Diploma Supplement (p. 27)</p>	<p>The peers confirm that the students of all three 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 including acquired soft skills and awards (extracurricular and co-curricular activities). The Transcript of Records lists all the courses that the graduate has completed, the achieved credits, grades, and cumulative GPA.</p>	<p>We are grateful for the positive comments from the peers for this point.</p>
<p>Criterion 5.3 Relevant rules (p. 27)</p>	<p>The peers confirm that the rights and duties of both UB and the students are clearly defined and binding. All rules and regulations are published on the university's Indonesian website 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.</p>	<p>We are grateful for the positive comments from the peers for this point.</p>

<p>Criterion 6 Quality management: quality assessment and development (p. 29)</p>	<p>The peers gain the impression that the departments take the students' feedback seriously and that changes are made if necessary. Nevertheless, the peers see that the results of the course questionnaires are not discussed with the students. Consequently, the peers expect UB to inform students about the results of the questionnaires and the teachers should discuss with them about possible improvements in the respective course. The feedback loops need to be closed.</p>	<p>For transparency, the questionnaire results have already been published in the faculty's website (see https://mipa.ub.ac.id/akademik/hasil-evaluasi-proses-belajar-mengajar/) and used for some improvements.</p> <p>Since the questionnaire was distributed at the end of the semester, there was no opportunity to discuss the results with students. Even so, student feedback is always discussed at the beginning of the same course in the following year, and implemented, such that the quality of lectures can always be improved. For more general issues, the results of the questionnaire and the feedback as well as the improvement strategy are discussed with students at a formal meeting organized by the faculty regularly at the beginning of the semester. Furthermore, the similar meeting will be held at the Study Program level. In this way the feedback loop is closed.</p>
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F Summary: Peer recommendations (31.01.2022)

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

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

Requirements

For all programmes

- A 1. (ASIIN 6) Close the feedback cycles and make sure that the results of the course surveys and the measures taken to improve the courses are communicated to the students who have taken the respective courses.

Recommendations

For all programmes

- E 1. (ASIIN 1.3, 2.3) It is recommended to provide students with more opportunities to improve their soft skills with respect to communication, presentation, and team leadership.
- E 2. (ASIIN 1.3) It is recommended to teach more courses in English or to introduce international classes in the degree programmes.

- E 3. (ASIIN 2.1) It is recommended to further strengthen the university's internationalization efforts, for instance by providing more information and funding opportunities for student mobility.
- E 4. (ASIIN 2.2) It is recommended to establish a system to monitor the actual student workload in the individual modules. Based on the results, the credit points of the modules, particularly the thesis, should be adjusted.
- E 5. (ASIIN 6) It is recommended to make student representatives members of the boards at UB and to directly involve them in the decision-making processes for further developing the degree programmes.

G Comment of the Technical Committees

Technical Committee 12 – Mathematics (02.03.2022)

Assessment and analysis for the award of the ASIIN seal:

The Technical Committee discusses the procedure and follows the auditors' opinions.

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

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

Vote: unanimous

Technical Committee 13 – Physics (09.03.2022)

Assessment and analysis for the award of the ASIIN seal:

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

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

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

Vote: unanimous

H Decision of the Accreditation Commission (18.03.2022)

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

The Accreditation Commission discusses the procedure and mostly agrees with the assessment of the peers and the Technical Committees. However, it acknowledges that the university has already established a reasonable feedback loop to the students by informing the students about the results of the course evaluation surveys the next time the respective course is taught. Discussing the results directly with the students who have taken the course would be desirable but should only be a recommendation, not a requirement. On the other hand, the current credits of the final thesis are markedly too low to cover the student's effective workload. Therefore, the university has to ensure that the amount of credits is increased in an appropriate manner.

The Accreditation Commission decides to award the following seals:

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

Requirements

For all programmes

- A 1. (ASIIN 2.2) Ensure that the credit points awarded for the thesis adequately reflect the students' workload.

Recommendations

For all programmes

- E 1. (ASIIN 1.3, 2.3) It is recommended to provide students with more opportunities to improve their soft skills with respect to communication, presentation, and team leadership.
- E 2. (ASIIN 1.3) It is recommended to teach more courses in English or to introduce international classes in the degree programmes.
- E 3. (ASIIN 2.1) It is recommended to further strengthen the university's internationalization efforts, for instance by providing more information and funding opportunities for student mobility.
- E 4. (ASIIN 2.2) It is recommended to establish a system to monitor the actual student workload in the individual modules.
- E 5. (ASIIN 6) It is recommended to make student representatives members of the boards at UB and to directly involve them in the decision-making processes for further developing the degree programmes.
- E 6. (ASIIN 6) It is recommended to also discuss the results of the surveys with the students who have taken the respective courses.

I Fulfilment of Requirements (24.03.2023)

Analysis of the peers and the Technical Committees 12 – Mathematics and 13 - Physics (06.03.2023)

Requirements

For all degree programmes

- A 1. (ASIIN 2.2) Ensure that the credit points awarded for the thesis adequately reflect the students' workload.

Initial Treatment	
Peers	Fulfilled Vote: unanimous Justification: UB has added two additional modules to adjust the workload. The total number of credits for the thesis was thus increased to 12 ECTS.
TC 12	fulfilled Vote: unanimous Justification: The Technical Committee follows the assessment of the peers without any changes.
TC 13	fulfilled Vote: unanimous Justification: The Technical Committee follows the assessment of the peers without any changes.

Decision of the Accreditation Commission (24.03.2023)

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

The Accreditation Commission decides to award the following seals:

Degree programme	ASIIN-label	Subject-specific label	Accreditation until max.
Ba Physics	All requirements fulfilled		30.09.2027
Ba Mathematics	All requirements fulfilled		30.09.2027
Ba Statistics	All requirements fulfilled		30.09.2027

Appendix: Programme Learning Outcomes and Curricula

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

Programme Educational Objectives

[PEO-1]. Successfully develop themselves according to their chosen profession by applying the mathematical concepts and methods in their work.

[PEO-2]. Active in various activities that support career development, or are completing or have completed their graduate studies in mathematics or other relevant fields.

[PEO-3]. Able to work together in teams and take the leading initiatives in the work organizations.

[PEO-4]. Have high responsibility and uphold professional ethics.

Intended Learning Outcomes

[ILO-1]. master mathematical theoretical concepts as well as mathematical modelling principles,

[ILO-2]. have the ability to think logically, critically, and systematically to solve simple, practical problems by applying basic mathematical methods,

[ILO-3]. able to develop mathematical thinking that starts from procedural/computational understanding to a broad experience, including exploration, logical reasoning, generalization, abstraction, and formal evidence,

[ILO-4]. able to construct, modify, and analyze mathematical problems so that they can evaluate the accuracy of the results and interpret them,

[ILO-5]. master mathematical knowledge and skills so that they can use them to solve simple mathematical problems with or without software,

[ILO-6]. able to apply mathematical theories and methods in the development of mathematics itself or other fields,

[ILO-7]. able to compose a scientific description by using scientific methods, to show the results accurately and correctly, and to present the results, both in speech and in writing,

[ILO-8]. able to work together and be responsible for solving mathematical problems and their application.

The following **curriculum** is presented:

Compulsory courses

Semester 1				Semester 2			
No.	Code	Course Name	CP	No.	Code	Course Name	CP
1.	MAM61101	Logic and Sets+	3	1.	MAM62101	Discrete Mathematics	3
2.	MAM61102	Elementary Linear Algebra+	4	2.	MAM62102	Algebraic Structures I	3
3.	MAM61201	Calculus I	4	3.	MAM62201	Calculus II	4
4.	MAM61401	Sciences	2	4.	MAM62202	Geometry Analytic	3
5.	MAM61001	Algorithm Programming	3	5.	UBU60005	English	2
6.	MAM61301	Introduction to Statistics	3	6.	MAM62301	Basic Programming	3
Total			19	Total			18
Semester 3				Semester 4			
No.	Code	Course Name	CP	No.	Code	Course Name	CP
1.	MAM61103	Algebraic Structures II	3	1.	MPK60001-5	Religion	3
2.	MAM61202	Calculus III	4	2.	MAM62203	Introduction to Complex Function II	2
3.	MAM61203	Introduction to Complex Function I	2	3.	MAM62302	Partial Differential Equations	3
4.	MAM61302	Ordinary Differential Equation	4	4.	MAM62303	Numerical Mathematics	4
5.	MAM61402	Introduction to Probability	3	5.	MAM62401	Mathematical Statistics	4
6.	MPK60006	Citizenship	3				
Total			19	Total			16
Semester 5				Semester 6			
No.	Code	Course Name	CP	No.	Code	Course Name	CP
1.	MAM61204	Introduction to Real Analysis I	4	1.	MAM62204	Introduction to Real Analysis II	2
2.	MAM61403	Operation Research I	3	2.	MAM62304	Mathematical Modeling	4
3.	MPK60007	Indonesian	3	3.	UBU60004	Entrepreneurship	3
4.	MPK60008	(Pancasila	2	4.			
Total			12	Total			9
Semester 7				Semester 8			
No.	Code	Course Name	CP	No.	Code	Course Name	CP
1.	UBU60002	Internship/ Community Service	3	1.	UBU60001	SKRIPSI (<i>Final Project</i>)	6
2.	MAM60001	Research Methodology and Scientific Writing in Mathematics	2				
Total			5	Total			6
Total compulsory course				: 33 courses (104 credits)			

Elective courses

Odd Semester				Even Semester				
No	Code	Course Name	CP	No	Code	Course Name	CP	
1.	MAM61104	Graph Theory	2	1.	MAM62103	Number Theory	2	
2.	MAM61105	Finite Group Theory	2	2.	MAM62104	Linear Algebra	2	
3.	MAM61106	Fuzzy Group Theory	2	3.	MAM62105	Applications of Elementary Linear Algebra	2	
4.	MAM61002	Introduction to Chemistry	3	4.	MAM62305	Software for Mathematics	3	
5.	MAM61003	Introduction to Biology	3	5.	MAM62402	Introduction to Linear Regression	2	
6.	MAM61004	Introduction to Physics	3	6.	MAM62403	Introduction to Experimental Design	2	
7.	MAM61303	Difference Equations	3	7.	MAM62106	Combinatorics)	2	
8.	MAM61304	Database System	3	8.	MAM62107	Matrix Ring	2	
9.	MAM61404	Financial Mathematics I	2	9.	MAM62108	Coding Theory	2	
10.	MAM61405	Mathematics Economics and Business	3	10.	MAM62205	Univalent Functions	2	
11.	MAM61107	Introduction to Modul Theory	2	11.	MAM62306	Introduction to Data Mining	3	
12.	MAM61205	Introduction to Differential Geometry	3	12.	MAM62307	Special Function	2	
13.	MAM61206	Introduction to Functional Analysis	3	13.	MAM62308	Introduction to Continuous Dynamical System	2	
14.	MAM61305	Numerical Optimization I	3	14.	MAM62309	Introduction to Computational Intelligence	3	
15.	MAM61306	Introduction to Discrete Dynamical System	2	15.	MAM62404	Insurance Mathematics I	2	
16.	MAM61307	Numerical Methods for Ordinary Differential Equations I	3	16.	MAM62405	Introduction to Forecasting Method	2	
17.	MAM61308	Introduction to Wave Modeling	2	17.	MAM62406	Financial Mathematics II	2	
18.	MAM61309	Variational Calculus	2	18.	MAM62206	Introduction to Topology	2	
19.	MAM61310	Introduction to Population Dynamics	2	19.	MAM62207	Measure Theory	2	
20.	MAM61311	Introduction to Digital Image Processing	3	20.	MAM62310	Numerical Methods for Partial Differential Equations	3	
21.	MAM61406	Stochastic Processes	3	21.	MAM62311	Introduction to Finite Element Methods	3	
22.	MAM61407	Insurance Mathematics II	2	22.	MAM62312	Introduction to Optimal Control	2	
23.	MAM61408	Introduction to Reliability Analysis	3	23.	MAM62313	Numerical Optimization II	3	
24.	MAM61207	Introduction to Fractal Geometry	3	24.	MAM62407	Insurance Risk Model	3	
				25.	MAM62408	Game Theory	2	
				26.	MAM62409	Operation Research II	3	
Total			62	Total			60	
Odd and Even Semester								
No	Code	Name Course						CP
1.	MAM60101	Capita Selecta in Algebra						2
2.	MAM60201	Capita Selecta in Analysis						2
3.	MAM60301	Capita Selecta in Applied Analysis						2
4.	MAM60302	Capita Selecta in Scientific Computing						2
5.	MAM60303	Capita Selecta in Computer Vision						2
6.	MAM60401	Capita Selecta in Operations Research						2
7.	MAM60402	Capita Selecta in Probability and Stochastic Processes						2
Total							14	

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

Programme Educational Objectives

[PEO-1]. Ability to apply statistics to solve problems in the fields of computing, social, economics, industry, and life sciences.

[PEO-2]. Ability to disseminate and develop theories of statistics and be ready to continue in a higher education level.

[PEO-3]. Ability to communicate their ideas, to work with a good ethic and high responsibility.

Intended Learning Outcomes

[ILO-1]. Mastery of basic scientific concepts and statistical analysis methods applied on computing, social science, humanities, economics, industry, and life science.

[ILO-2]. Ability to arrange or choose an efficient data collection/ data generated design that applies in surveys, experiments, or simulations.

[ILO-3]. Ability to manage, analyze, and solve real-life problems in computing, social humanities, economics, industry, and life sciences using statistical methods with software assistance, then present and communicate the results.

[ILO-4]. Mastery of at least two statistical software, including open source one.

[ILO-5]. Ability to apply logical, critical, systematic, and innovative thinking independently when applied to science and technology that contain humanities values, based on scientific principles, procedures, and ethics with excellent and measurable results.

[ILO-6]. Ability to take appropriate decisions to solve the problems in their respective fields, based on the information and data analysis.

[ILO-7]. Ability to maintain and develop a job network and supervise and evaluate the team's performance which they lead.

[ILO-8]. Ability to apply and internalize the spirit of independence, struggle, entrepreneurship, based on values, norms, and academic ethics of Pancasila in all aspects of life.

The following curriculum is presented:

Compulsory courses

Semester 1				Semester 2			
No	Code	Course Name	CP	No	Code	Course Name	CP
1.	UBU60005	English	3	1.	MPK60001-5	Islam, Catholic, Christianity, Hinduism, and Buddha	2
2.	MAS61211	Introduction to Life Sciences	3	2.	MAS62111	Introduction to Probability Theory	3
3.	MAS61311	Introduction to Economics	3	3.	MAS62121	Statistical Method II	3
4.	MAS61111	Mathematics	3	4.	MAS62122	Introduction to Regression Analysis	3
5.	MAS61112	Introduction to Sets and Logics	2	5.	MAS62112	Mathematics I	3
6.	MAS61312	Introduction to Management	2	6.	MAS62113	Matrices and Vector Spaces	3
7.	MAS61121	Statistical Method I	2	7.	MAS62331	Financial Mathematics	3
8.	MPK60007	Indonesian Language	2				
Total			21	Total			20
Semester 3				Semester 4			
No	Code	Course Name	CP	No	Code	Course Name	CP
1.	MAS61131	Basics of Programming	3	1.	MAS62131	DataBase	3
2.	MAS61321	Linear Programming	3	2.	MAS62114	Introduction to Numerical Analysis	3
3.	MAS61113	Mathematics II	3	3.	MAS62332	Statistical Quality Control	3
4.	MAS61114	Mathematical Statistics	3	4.	MAS62115	Mathematical Statistics II	3
5.	MAS61212	Introduction to Experimental Design	3	5.	MPK60006	Citizenship	2
6.	MAS61122	Nonparametric Statistics	3	6.	MAS62221	Categorical Data Analysis	3
Total			18	Total			17
Semester 5				Semester 6			
No	Code	Course Name	CP	No	Code	Course Name	CP
1.	MAS61123	Introduction to Linear Model	3	1.	MAS62123	Multivariate Analysis I	3
2.	MAS61124	Sampling and Survey rvey Technique	3	2.	MAS62132	Mining Data	3
3.	MAS61322	Time Series Analysis	3	3.	MAS62124	MPPI (Scientific Research and Writing Method)	2
4.	MAS61132	Computational Statistics	3				
5.	UBU60003	Entrepreneurship	2				
6.	UBU60005	PKM (Community Development Participation)	4				
7.	MPK60008	Pancasila	2				
Total			20	Total			8
Semester 7				Semester 8			
No	Code	Course Name	CP	No	Code	Course Name	CP
1.	UBU63001	PKL (Field Work-Study)	3	1.	UBU60001	SKRIPSI (Final Project)	6
Total			3	Total			6
Total compulsory course				: 39 courses (113 credits)			

Elective courses

Odd Semester				Even Semester			
No	Code	Course Name	CP /Sem.	No	Code	Course Name	CP /Sem.
1.	MAS61115	Stochastic Process	3/3	1.	MAS62212	Natural Sciences	2/2
2.	MAS61323	Econometrics	3/3	2.	MAS62125	Exploratory Data Analysis	2/2
3.	MAS61331	Decision Theory	2/3	3.	MAS62311	Microeconomics	3/2
4.	MAS61324	Macroeconomics	3/3	4.	MAS62133	Data Structure	¾
5.	MAS61332	Actuarial Science	3/3	5.	MAS62211	Analysis of Variance	¾
6.	MAS61325	Smoothing Method	2/3	6.	MAS62333	Risk Theory	¾
7.	MAS61133	Bayesian Analysis	3/5	7.	MAS62321	Simulation Method	2/4
8.	MAS61125	Spatial Analysis	3/5	8.	MAS62126	Advanced Regression Analysis	¾
9.	MAS61333	Analysis of Reliability	3/5	9.	MAS62322	Operation Research	¾
10.	MAS61221	Response Surface	2/5	10.	MAS62323	Forecasting Methods	2/6
11.	MAS61222	Biometrics	3/5	11.	MAS62134	Advanced Computational Statistics	2/6
12.	MAS61134	Optimization Technique	2/5	12.	MAS62222	Analysis of Survival	3/6
13.	MAS61334	Advanced Statistical Quality Control	3/5	13.	MAS62135	Fuzzy Logic Model	3/6
14.	MAS61326	Measurement Design	2/5	14.	MAS62334	Industrial Statistics	2/6
15.	MAS61327	Social Statistics	2/5	15.	MAS62324	Advanced Econometrics	3/6
16.	MAS61136	Management Information System	3/5	16.	MAS62325	Nonlinear Time Series Analysis	2/6
17.	MAS61137	Artificial Neural Network Models	3/7	17.	MAS62223	Capita Selecta in Life Sciences	2/6
18.	MAS61223	Advanced Categorical Data Analysis	2/7	18.	MAS62136	Big Data Analysis	3/6
19.	MAS61116	Multivariate Analysis II	3/7				
20.	MAS61117	Statistical Consulting	2/7				
21.	MAS61335	Capita Selecta in Statistical Economics	2/7				
22.	MAS61138	Capita Selecta in Computational Statistics	2/7				
Total			53	Total			48

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:

Programme Educational Objectives

[PEO-1]. Mastering Science and methodology in physics and implementing it in solving problems in their work.

[PEO-2]. Have a strong commitment to developing science and technology based on physics and its application and can further develop themselves through independent learning in a heterogeneous and dynamic environment.

[PEO-3]. Have ethical and professional attitudes, communication skills, managerial skills, and teamwork abilities.

[PEO-4]. Have the ability to link physical knowledge in a broader perspective in contributing to the development of science and technology for society.

Intended Learning Outcomes

[ILO-1]. Students will demonstrate an understanding of the core principles of physics (classical and modern) to identify physical problems in a system.

[ILO-2]. Students will analyze and formulate physical problems in a given system by using models and mathematical equations.

[ILO-3]. Students will demonstrate an understanding of the scientific method by conducting physics experiments, data acquisitions and data processing to produce good analysis and conclusions.

[ILO-4]. Students will employ mathematics, computational methods, and experiment in investigating and solving physics problems.

[ILO-5]. Students will demonstrate advanced study using the basic physics knowledge in solving physics problems comprehensively

[ILO-6]. Students will demonstrate physics in interdisciplinary studies, especially in medical and environmental issues.

[ILO-7]. Students will have enthusiasm for lifelong learning and independently improve their capability to adapt to heterogeneous and dynamic environments.

[ILO-8]. Students will develop basic working good practices (attitude, time management, communication, and teamwork) through learning experiences.

[ILO-9]. Students will demonstrate proficiency in Bahasa Indonesia and English, especially for scientific purposes.

[ILO-10]. Students will demonstrate logical, critical, systematic, and innovative thinking in the scientific (physics) reasoning and proficiency to present the matter orally and in writing (paper/thesis).

[ILO-11]. Students will be able to make appropriate decisions in solving problems using their physics knowledge.

[ILO-12]. Students will demonstrate the ability in team working and networking (supervisors and colleagues)

The following curriculum is presented:

Compulsory courses

Semester 1					Semester 2				
No	Code	Courses	Credits		No	Code	Courses	Credits	
			Lect	Pract				Lect	Pract
1	MPK60007	Indonesia Language	3		1	UBU60005	English	2	
2	MAB60050	Biology	2		2	MPK60001-0005	Religion Education	3	
3	MAB60051	Biology Practical Works		1	3	MAP62103	Physics II	3	
4	MAK61004	Chemistry	2		4	MAP62104	Physics II Practical Works		1
5	MAP61005	Chemistry Practical Work		1	5	MAP62120	Mathematical Physics I	3	
6	MAP61130	Introduction to Mathematical Physics	3		6	MAE62101	Fundamental Electronics	2	
7	MAP61101	Physics I	3		7	MAE62102	Fundamental Electronics Pract. Works		1
8	MAP61102	Physics I Practical Works		1	8	MAP62110	Thermodynamics	3	
9	MAP61118	Measurement Method in Physics	2						
Total			18		Total			18	

Semester 3					Semester 4				
No	Code	Courses	Credits		No	Code	Courses	Credits	
			Lect	Pract				Lect	Pract
1	MAP61103	Electromagnetism	3		1	MAP62123	Mathematical Physics III	3	
2	MAE61105	Fundamental Electronics II	2		2	MAP62224	Medical Physics I	2	
3	MAE61106	Fundamental Electronics II Pract. Works			3	MAP62125	Optics	3	
4	MAP61121	Mathematical Physics II	3		4	MAP62126	Electrodynamics	3	
5	MAP61128	Waves	3		5	MAP62102	Mechanics	3	
6	MAP61108	Modern Physics	3		6	MAP62117	Nuclear Physics	3	
7	MAP61123	Research Methodology & Sci. Writings	2		7	MPK 60008	Pancasila	2	
8	UBU 60004	Entrepreneurship	3						
Total			20		Total			19	
Semester 5					Semester 6				
No	Code	Courses	Credits		No	Code	Courses	Credits	
			Lect	Pract				Lect	Pract
1	MAP61224	Medical Physics II	2		1	MAP62127	Experimental Physics II		2
2	MAP61125	Experimental Physics I		2	2	MAP62113	Environmental Physics II	2	
3	MAP61116	Environmental Physics I	2	1	3	MAP62115	Introduction to Solid State Physics	3	
4	MAP61112	Statistical Physics	4		4	MAP62116	Quantum Physics	4	
5	MAP61113	Computational Physics	3						
6	MAP61114	Computational Physics Works		1					
7	MAP61117	Advanced Mechanics	2						
8	MPK 60006	Citizenship	3						
Total			20		Total			11	
No	Code	Courses	Credits						
			Lect	Pract					
1	UBU60001	Final Project (>120 sks)		6					
2	UBU60002	Field Work (>90 sks)		3					
3	UBU60003	Community Service (>90 sks)		3					
TOTAL			12						

Elective courses

Code	Courses	Semester	Credits	
			Lect	Pract
Biophysics				
MAP62230	Biophysics I	2	2	1
MAP62231	Physical-Chemical Equilibrium	2	2	0
MAP62233	Anatomy and Physiology	2	2	0
MAP61230	Biophysics II	3	2	1
MAP61232	Physical Biochemistry	3	2	1
MAP61234	Radiobiology	3	2	0
MAP60234	Basics of Medical Instruments	4	2	0
MAP62232	Medical Imaging	4	3	0
MAP61233	Radiation Protection and Dosimetry	5	3	0
MAP61235	Introduction to Biosensor	5	2	0
MAP60235	Capita Selecta Medical Physics and Biophysics	6	3	0
MAP62234	Physics Radiotherapy	6	3	0
MAP62236	Quality Control of Medical Instrumentation	7	2	1
MAP61236	Radiotherapy Treatment Planning System	7	2	1
Material Physics				
MAP61361	Material Physics	3	3	0
MAP61364	Polymer Physics	3	3	0
MAP60366	Plasma Physics	3	3	0
MAP62361	Functional Material	4	3	0
MAP62364	Semiconductor	4	3	0
MAP62365	Ceramics and Composite	4	3	0
MAP61365	Thin-Film Technology	5	3	0
MAP60363	Material Practical Works	5	2	0
MAP61362	Material Analysis	5	2	1
MAE61207	Sensor Material	5	3	0
MAP62362	Material Technology	6	3	0
MAP62370	Material Computation	6	2	0
Computational Physics				
MAP61476	Modelling and Visualization	3	3	0
MAP61477	Algorithm and Programming	3	2	1
MAP61472	Fluid Dynamic Modelling	5	2	0
MAP62471	Artificial Intelligent Modelling	4	2	0
MAP62473	Computation Parallel Programming	4	3	0
MAP62472	Image Processing	4	2	0
MAP61471	Astronomical Computation	5	2	0
MAP61479	Optical and Electrical Simulation	5	2	0
MAP61473	Tomography Computation	5	2	0
MAP62470	Material Computation	6	2	0
MAP62476	Atomic Computation	6	3	0
MAP61474	Advanced Computational Physics	7	3	0
MAP61075	Capita Selecta in Computation	7	2	0