



ASIIN Seal

Accreditation Report

Bachelor's Degree Programs

Mathematics

Physics

Provided by

Universitas Lampung

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A About the Accreditation Process

Name of the degree program (in original language)	(Official) English translation of the name	Labels applied for ¹	Previous accreditation (issuing agency, validity)	Involved Technical Committees (TC) ²
Matematika	Mathematics	ASIIN	BAN-PT	12
Fisika	Physics	ASIIN	BAN-PT	13
Date of the contract: 16.11.2021 Submission of the final version of the self-assessment report: 11.01.2023 Date of the onsite visit: 05.07.2023 – 06.07.2023 at: Campus Universitas Lampung in Bandar Lampung				
Expert panel: Prof. Dr. Dodi Devianto, Andalas University Prof. Dr. Mathias Getzlaff, Heinrich-Heine University Düsseldorf Prof. Dr. Christof Schelthoff, University of Applied Sciences Aachen Dr. Hartmut Presting, Daimler AG Felix Cahyadi, student at the Institut Teknologi Bandung				
Representatives of the ASIIN headquarter: Dr. Andrea Kern				
Responsible decision-making committee: Accreditation Commission for Degree Programs				
Criteria used: European Standards and Guidelines as of May 15, 2015 ASIIN General Criteria, as of December 10, 2015				

¹ ASIIN Seal for degree programs.

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

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 Programs

a) Name	Final degree (original/English translation)	b) Areas of Specialization	c) Corresponding level of the EQF ³	d) Mode of Study	e) Double/Joint Degree	f) Duration	g) Credit points/unit	h) Intake rhythm & First time of offer
Mathematics	S. Math (Sarjana Matematika)/ Bachelor of Mathematics	1) Analysis and Applied Mathematics 2) Algebra, Operations Research and Combinatorics 3) Statistics	6	Full time	-	8 Semester	230.4 ECTS/ 144 sks CP	Annually in August / September 1998
Physics	S. Si (Sarjana Sains) / Bachelor of Science	1) Physics of Instrumentation 2) Physics of Materials 3) Physics of Energy	6	Full time	-	8 Semester	230.4 ECTS/144 sks CP	Annually in August / September 1998

The University of Lampung (Universitas Lampung; UNILA) is located in Bandar Lampung on the southern tip of Sumatra Island, Lampung province, west Indonesia. The university was established in 1965 and has emerged since as the biggest state university in Lampung. It now offers 108 study programs divided among eight faculties. The university employs 1,500 lectures and has 41,000 enrolled students. The goal of the UNILA is to become one of the top 10 universities in Indonesia until 2025. This includes inviting international accreditation to foster their reputation in Indonesia and to receive global recognition.

In 1998, the bachelor study programs Mathematics and Physics were established within the Faculty of Mathematics and Natural Sciences in the Department of Mathematics and Department of Physics, respectively. The faculty works towards becoming a leading institute in their field and providing a real contribution to sustainable development for community welfare.

For the bachelor's degree program "Mathematics", UNILA has presented the following profile in the self-assessment report:

"In science, mathematics has a unique role and position. Besides having to be able to develop mathematics itself so that it can enrich the treasures of science, mathematics is also a means of thinking for other fields of science. Therefore, the characteristics of mathematics that are being and will be carried out at the Undergraduate Programme in Mathematics, FMIPA-University of Lampung, are a unique combination of theoretical and applied levels

³ EQF = The European Qualifications Framework for lifelong learning

to identify and solve real-world problems, such as those in education, industry, environment, agriculture, health, social and economy. Furthermore, in order for problem solving using quantitative methods, namely mathematics and statistics, to be efficient and effective, the Undergraduate Programme in Mathematics is oriented toward the utilization of computer technology. Therefore, the quantitative methods developed in the Undergraduate Programme in Mathematics are equipped with knowledge of computer programs that will support graduates to be able to implement the knowledge gained so that they can be effective and efficient in social life. Thus, graduates are expected to be able to compete in the job market.”

For the bachelor’s degree program “Physics”, UNILA has presented the following profile in the self-assessment report:

„The curriculum of S1 Physics Study Program at UNILA is prepared in line with the vision of the Faculty of Mathematics and Natural Sciences, which is based on past conditions, present, and opportunities and challenges that will be faced in the future. In addition, it also takes into account the strength of the Physics Study Program and the local wisdom of Lampung Province and the Unitary State of the Republic of Indonesia as the basic capital for preparing the vision of the study program. As a visualization of the plenary form of the PS S1 Physics curriculum, it is formulated as follows:

Physics Study Program produces graduates who excel in the fields of instrumentation physics, material physics and energy physics to manage resources based on local wisdom in the era of the industrial revolution 4.0.”

C Expert Report for the ASIIN Seal

1. The Degree Program: Concept, content & implementation

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

Evidence:

- Self-assessment report
- Academic regulations
- Webpage UNILA <https://www.unila.ac.id/en/>
- Webpage „Mathematics“ <https://matematika.fmipa.unila.ac.id/>
- Webpage „Physics“ <https://fisika.fmipa.unila.ac.id/>
- Discussion during the audit

Preliminary assessment and analysis of the experts:

The bachelor study program “Mathematics” is associated with the Department of Mathematics inside the Faculty of Mathematics and Natural Sciences at the University of Lampung. The university describes the vision and mission of the study program in their self-assessment report (SAR) as following:

“The Vision of Undergraduate Programme in Mathematics FMIPA University of Lampung is *“To produce mathematics graduates who are adaptive, have integrity and empathy to realize sustainability in diversity.”*

The Mission of the Program is to:

- a. Carrying out effective and quality learning activities in the fields of mathematics through creative and innovative learning as well as a conducive academic atmosphere that is relevant to local, national and international needs;
- b. Developing and improving research and service activities in scientific groups;
- c. Carrying out community service activities in the fields of mathematics to improve the quality of community life;

- d. Conducting and improving synergistic partnerships with other parties, both government and non-government institutions, in the context of the development of the tridharma of the university.”

Based on these standards, the university summarizes these objectives for the bachelor program “Mathematics”:

- a. “Producing graduates who are equipped with the conceptual understanding of mathematics and determined personality required using quantitative reasoning and analysis effectively in their personal, professional, and community lives.
- b. Producing an innovative scientific community that fostering creativity, productivity, critical and open-minded thinking, high integrity, and responsiveness to social changes.
- c. Producing graduates who are equipped with strong mathematics both as a discipline and as a tool, computational and related technology skills to solve real-world problems in various fields and to allow them to pursue a higher degree or graduate program, and equipped with effective written and oral communication skills in a mathematical setting.
- d. Producing graduates with a broad foundation of knowledge and skills to cultivate a commitment to life-long learning.
- e. Establishing collaboration with government and non-government, as well as other higher education institutions, in both the country and abroad.”

These objectives are further expressed in the following program learning outcomes (PLOs). They can be divided into attitude, general skills, special skills, and knowledge.

Attitude	PLO 1	Having piety to God Almighty, having a sense of awareness and responsibility to the nation and state based on the values of the Pancasila
	PLO2	Internalizing attitudes; punctuality; learning and cooperative methods; and internalizing the spirit of responsibility, independence, struggle, and entrepreneurship
General skills	PLO3	Able to adapt, innovate and to contribute based on the framework of scientific method in the context of the development of global science and technology while paying attention to humanity aspects
	PLO4	Able to communicate orally and verbally in international language (English).

Special skills	PLO5	Able to communicate and develop mathematical thinking, from mastering procedure/computation to mastering application, including exploration, logical reasoning, generalization, abstraction, and formal proof.
	PLO6	Able to observe, identify, formulate, and solve a problem through mathematical approach by deploying technologies.
	PLO7	Able to structurally reconstruct/modify, analyze/think the system/problem to the mathematical model, and to assess the accuracy and interpret the results.
	PLO8	Able to make right decisions by using various alternatives of available mathematical problem-solving.
	PLO9	Able to collaborate, adapt, and be a lifelong learner.
	PLO10	Able to apply the fields of analysis, algebra, operation research, statistics, and applied mathematics to solve problems in the local, regional, national or international scope.
Knowledge	PLO11	Mastering concepts and theories of mathematics including mathematical logic, discrete mathematics, algebra, analysis, geometry, and probability, and statistics.
	PLO12	Mastering the principles of mathematical modeling, linear programming, differential equations, and numerical methods using mathematics/ statistics software, including open source based software.

The university submitted an objectives-module matrix to indicate how individual modules contribute to each PLOs and how these further compare to the subject specific criteria of the ASIIN technical committee 12 – Mathematics. The university states that the PLOs allow the students to achieve a level equivalent to level 6 according to the Indonesian Qualification Framework. Students graduate with a “Bachelor in Mathematics” or Sarjana Matematika (S.Mat) in Indonesian.

Graduates of this study program have opportunities to work in various fields and industries or continue their academic pursuit. Tracer studies reveal that the majority of graduates find occupations as academics, research assistants, consultants, and as practitioners and entrepreneurs. Based on tracer studies, 72% of all graduates work in a job (government or private company), while 6% work as entrepreneurs, 8% pursue their master’s degree and 14% are unemployed. Around 70% of all graduates are able to find a job within less than six

months after graduation. In the past years (with an exception during the COVID-19 pandemic), the number of students continuing their higher education was continuously increasing. Graduates from the bachelor program “Mathematics” work within different sectors such as education, financial services and insurance, information, communication and transportation or agriculture, forestry and fishery.

The review of the qualification profile of the bachelor program “Mathematics” involves internal and external stakeholders, including university and faculty, academic and support staff, alumni, students, experts and other external partners.

For the bachelor study program “Physics”, the university describes the vision and mission in the SAR as following:

“The vision of the Undergraduate Programme in Physics FMIPA University of Lampung is “to produce graduates who are excellent in instrumentation, material, and energy physics to manage resources based on local wisdom in the industrial revolution 4.0 era”.

The Mission of the Undergraduate Programme in Physics FMIPA University of Lampung is to:

- a. organize education in physics for producing graduates who are ready to apply their knowledge in the fields of instrumentation, materials, and energy physics in the industrial revolution 4.0 era and able to continue their education to the postgraduate level;
- b. carry out research in the fields of instrumentation physics, materials, and energy to manage local resources;
- c. carry out community service in the areas of instrumentation, materials, and energy physics to improve the community's ability to manage local resources;
- d. cooperate with government/private institutions/agencies in utilizing physics of instrumentation, materials, and energy”.

Based on these targets, UNILA has developed the following objectives:

- a. “Produce graduates who are ready to apply their knowledge in the fields of instrumentation, materials, and energy physics in the era of the industrial revolution 4.0 and able to continue their education to the postgraduate level;
- b. produce and develop science and technology in the fields of instrumentation, physics, materials, and energy to manage local resources; establish mutually beneficial cooperation with government/private institutions in utilizing the physics of instrumentation, materials, and energy.”

UNILA has defined program learning outcomes to describe the qualities, competencies and skills the students achieve during their studies.

Attitude	PLO 1	Implement religious and Pancasila values in daily life
	PLO 2	Internalize attitudes, time management, learning and collaboration techniques, responsibility, independence, struggle, and entrepreneurship
General skills	PLO 3	Able to adapt, innovate and contribute within the framework of the scientific method for the development of global science and technology by paying attention to the humanities aspects
	PLO 4	Able to communicate orally and in writing in Indonesian and English
Special skills	PLO 5	Mastering the concepts of classical physics and familiar with the fundamentals of quantum, atomic and molecular, nuclear, elementary particle, and solid-state physics and their application in various examples of problems
	PLO 6	Able to apply knowledge of physics to various fields (material physics, instrumentation physics, or energy physics), act in professional activities (technology or industry), and able to recognize new trends in the field of physics.
Knowledge	PLO 7	Able to formulate various problems in life using mathematics and physics concepts, analyze scientifically, theoretically, or experimentally, and disseminate them.
	PLO 8	Able to use a computer for programming, computing, modeling, and simulating as a tool to solve problems in research, industry, and professional activity

The university submitted an objectives-module matrix to illustrate the contribution of each module to the PLOs and subject specific criteria of the ASIIN technical committee 13 – Physics. The university states that these PLOs allow the students to achieve a level equivalent to level 6 according to the Indonesian Qualification Framework. Students graduate with a Bachelor in Science” or Sarjana Sains (S. Si.) in Indonesian.

Graduates from the bachelor program “Physics” have career perspectives as researcher or other jobs within academia. They have opportunities to work in industrial physics including instrumentation physics, material physics or energy physics. In addition, they are able to pursue careers as entrepreneurs or technopreneurs. The presented tracer studies revealed

that 43% of the graduates from the last recent years found job in accordance to their qualifications (private companies, governmental companies and education), 9% are working as entrepreneurs/technopreneurs, 11% continuing their higher education by studying for a master's degree whereas 37% are not working. During the last years, the number of students continuing in the master's program was stable between 8–12%. While the number of graduates working in the governmental sector was drastically decreasing since 2019 (from 43% to 8%), the number of job opportunities in private companies was increasing from 55% to 77%. Likewise, the number of graduations finding a career in education was also significantly higher in 2021 with 15% in comparison to the precious years.

The experts discuss the development of the graduates' competence profile in the study program under review. The representatives of the rector's office confirm that they conduct annual tracer studies with alumni and employers to ensure the skills of their graduates meet the demands on the job market. Students are well accepted in diverse companies around Lampung and in other parts of Indonesia. UNILA supports the students with various extracurricular activities to pursue careers in education, academia or as entrepreneurs. The program coordinators support this statement and add that they additionally receive feedback from external stakeholders (private and governmental companies in particular) suggesting improvements in the intended learning outcomes. They add that the review of the competences at graduation also considers the current mission and visions of UNILA. In their opinion, universities in Indonesia are always competing with each other; therefore, in order to grow and improve their programs, they review the students' competences at graduations in detail. The program coordinators of the program "Mathematics" add that they usually stay in contact with their alumni as many of them request recommendations for their job applications. Therefore, they know that these graduates apply for jobs in the industry, often in IT, involving the analysis of data. Other graduates work in banks and insurance companies or as teachers at schools or universities. Nevertheless, the majority of graduates from the program "Mathematics" work for governmental agencies, especially the Central Bureau of Statistics. The experts further raise the issue of "Energy Physics" since this is the only specific topic included in the vision of the bachelor program "Physics." The program coordinators explain that energy physics is a hot topic these days in Indonesia because the government supports the improvements to the energy situation in Indonesia. Within UNILA, this department combines different fields from nuclear physics to computer simulations, which gives the graduates good prospects on the job market in the industry. The alumni and representatives from the industry further confirm that they were previously invited to review the study programs and comment on potential improvements.

The representatives of the rector's office also highlight that the number of students who continue with their master's degree was increasing during the last years. They note that

one major factor is financing (scholarships); therefore, UNILA is actively supporting their students to apply for governmental scholarships. UNILA offers scholarships to exempt students from tuition fees, but these scholarships do not cover any costs of living. They are aware that there is a great number of students, who want to pursue a master's degree and a PhD. The experts acknowledge this positive trend.

The experts are especially interested, why the graduates of the bachelor program "Mathematics" receive a "Bachelor of Mathematics" while all other study programs at the faculty receive a "Bachelor of Science." The program coordinators explain that they could choose between these two titles several years ago and the university selected the "Bachelor of Mathematics." However, they add that it is possible to change this title. The experts recommend changing the awarded degree, referring in particular to the strategy of internationalization of UNILA. Since in most universities around the globe, graduates in the field of mathematics receive a "Bachelor of Science", the experts consider it advisable if this change is feasible. The program coordinators can follow their explanation and agree to consider this in the future.

In the discussion, the students are highly pleased with their study programs in general. They are convinced that the most recent changes in the study programs allows them to get the skills necessary to be competitive on the job market. The students therefore consider their employability as high, which is also confirmed by the alumni. Similarly, the representatives from the industry appraise the qualification of the students during the internships and in case of employment. Despite the students' excellent skills in their field, the partners from the industry mention on several occasions that the students still lack competences in entrepreneurship. They acknowledge that the students have general good competences in IT and in analyzing data, yet miss entrepreneurial competences of interest for the industry. The experts consider this as evidence that the two study programs under review are well established in the region.

The experts are concerned about the high numbers of graduates "not working" and if one might demand changes in the qualification profile of the study programs. The representatives of the rector's office state that these results are based on tracer studies conducted one year after graduation. They have contacted several of these graduates to investigate this situation. Based on their data, they state that several selected "unemployed" since their job does not suit the qualification (profile) of their study program. Others work as freelancers or entrepreneurs in education (e.g. private teachers) and do not consider this a "real" job whereas others married and started a family. The experts remark that these results are misleading and therefore they should improve the tracer studies to allow diverse answers. They suggest that UNILA should allow the alumni to give more diverse answers to reflect their kind of occupation after graduation.

In summary, the experts have the impression, that UNILA has described the objectives and learning outcomes of the degree programs under review (i.e. the intended qualifications profile) in a brief and concise way. These are well anchored, binding and easily accessible to the public, to students, teaching staff and anyone else interested. The experts consider the aims and learning outcomes reflect the level of academic qualification aimed at (EQF 6) and are equivalent to the learning outcome examples described in the respective ASIIN Subject-Specific Criteria of the Technical Committee 12 – Mathematics and the Technical Committee 13 – Physics, respectively. In the opinion of the experts, the learning outcomes are viable and valid. UNILA has described conclusive processes to analyze and review the study programs on a regular basis and develop them further if necessary. The relevant stakeholders were included in the process of formulating and further developing the objectives and learning outcomes. The intended qualifications profile of each study program allows the students to take up an occupation, which corresponds to their qualification (professional classification). Nevertheless, the experts advise UNILA to rethink issuing a “Bachelor in Mathematics” in the program “Mathematics.” To meet the international convention, the experts suggest awarding a degree in “Bachelor of Science” instead.

Criterion 1.2 Name of the degree program

Evidence:

- Self-assessment report
- Diploma and diploma supplement
- Webpage „Mathematics“ <https://matematika.fmipa.unila.ac.id/>
- Webpage „Physics“ <https://fisika.fmipa.unila.ac.id/>

Preliminary assessment and analysis of the experts:

The University of Lampung describes in their self-assessment report that the name of the bachelor programs “Mathematics” and “Physics” were chosen based on the content, curriculum and indented learning outcomes of the study program. They are in accordance with the Indonesian regulations and comparable to national and international study programs. The study program “Mathematics” allows the students to specialize in a broad spectrum of areas in the field of mathematics including statistics, analysis and applied mathematics as well as algebra, operations research and combinatorics. The bachelor program “Physics” gives the students the opportunity to deepen their knowledge in material physics, energy physics and instrumentation.

The experts are convinced that the name of the degree programs under review reflect the intended aims and learning outcomes as well as, fundamentally, the main course language.

Criterion 1.3 Curriculum

Evidence:

- Self-assessment report
- Webpage „Mathematics“ <https://matematika.fmipa.unila.ac.id/>
- Webpage „Physics“ <https://fisika.fmipa.unila.ac.id/>
- Module handbook of each study program
- Curriculum document of each study program
- Curricular overview of each study program
- Objectives module matrix of each study program
- Discussion during the audit

Preliminary assessment and analysis of the Experts:

The University of Lampung describes in their SAR how the curriculum of each study program reflects the intended learning outcomes. Individual learning units are designed as modules or courses, which are arranged to reach the qualification profile with continuous learning. The curricula of both study programs under review consider the study materials, processes and learning assessment as guidelines for the implementation of the study programs.

Both bachelor programs contain start with a set of modules focusing on character building, such as “Pancasila”, “Citizenship”, “Ethics and local Wisdom” and “Entrepreneurship.” These subjects are placed in the first and second semester of the study programs. In addition, students learn supporting tools such as “English”, “Indonesian.” From the first semester, students also receive subject specific training. To prepare the students for their final project and bachelor thesis, the students attend the courses “Research methodology”, “Scientific writing” and the two seminars “project prop seminar I & II”. All students further are required to complete the “community service program.”

In the bachelor’s degree “Mathematics”, basic courses in mathematics start various courses are distributed among the first four semesters. The content of the bachelor’s degree program “Mathematics” is benchmarked against the guidelines of the Indonesian Mathematics Society. The basics in mathematics include: (1) mathematical logic, (2) discrete mathematics, (3) calculus differential and integral, (4) statistics probability theory, (5)

complex functions, (6) introduction to real analysis, (7) algebra, (8) geometry, (9) numerical method, (10) algorithm and programming, (11) differential equations, (12) linear program and (13) mathematical modelling. In addition, students receive mathematical skills in multivariable calculus, algebraic structure and ordinary differential equations and partial differential equations. These courses are accompanied by elective courses, which allow the students to deepen their knowledge based on their interests. The available elective courses differ in each semester to ensure they match the competences of the students. The electives follow the division of three fields of interest: (1) Mathematics, separated into the groups (a) Analysis and Applied Mathematics and (b) Algebra, Combinatorics and Operations Research and (2) Statistics (group Statistics). Each group is responsible for designing and compiling the courses and developing the teaching materials.

In the discussion, the experts consider that the separation into these three groups (Analysis and Applied Mathematics; Algebra Combinatorics and Operations Research, and statistics) does not meet the international standards. The experts address that a division between the subjects in pure mathematics, applied mathematics and statistic would be advisable, which would also help the employer to evaluate the skills of the students quickly. The program coordinators remark that for employer in Indonesia, the main aspect in job applications is the attitude of the person and the recommendations they received. In many cases, the students/graduates have to learn additional specific skills in the company; therefore, the main focus is on giving a great basic education and teach the students how to quickly learn new competences. The experts acknowledge this explanation; however, they insist that a more standardized separation would be beneficial for the students if they want to continue their education (abroad). In addition, this basic separation of these three fields of mathematics is commonly used at universities and research institutes abroad, which might match UNILA's strategic plan of internalization.

The bachelor program "Physics" starts with basic science courses including "Elementary Chemistry", "Mathematics" and "Elementary Physics" before this knowledge is deepened in additional courses in basic mathematics and physics in the second semester. The supporting courses take place in the first and second semester and include "English", "Computer Programming", "Indonesian Language" and "Information technology." The third and fourth semester teaches the students the basics in physics such as "Thermodynamics", "Experimental Physics", "Mechanics" and "Electronics." Starting from the fifth semester, the students need to choose one of their specializations or "groups." Depending on the selected group, the students can choose electives from a defined pool of subjects to receive more knowledge in accordance to their interests. These groups are (1) Energy Physics, (2) Material Physics and (3) Instrumentation. The subjects in Energy Physics include basics in

“Environmental Physics”, “Renewable Energy”, “Battery Technology” as well “Nuclear Reactor Modelling and Simulation.” In the specialization Material Physics, students take courses on “Metal and Corrosion”, “Composites”, “Sensor Materials” and “Nano materials”. The group Instrumentation includes modules on “Digital Electronics”, Sensor and Actuator”, “Medical Instrumentation” as well as “Control Systems.”

The curriculum of both study programs under review is evaluated at least every four years. These periodic revisions consider the input of lecturers, students, alumni, education staff, related institutions, and stakeholders. The last updates of the curriculum was done in 2020 to implement the Independent Learning-Independent Campus or Merdeka Belajar-Kampus Merdeka program (MBKM). This program encourages students to learn one semester outside their study program and two semesters outside of their University. The university recognizes all the credits students obtain for those three semesters. The MBKM program allows the students to gain experience outside the campus offering them to (1) take part in an internship in the industry, (2) conduct research, (3) work on an independent project, (4) participate in student exchange, (5) work as teaching assistants in education, (6) engage in entrepreneurial activities, or (7) work in a humanitarian project. The activities of this program can be converted to credit points to replace existing lectures. UNILA follows the guidelines of the Indonesian government in order to convert the activities to credit points. This conversion is done in discussion between the supervisors at UNILA, the responsible person e.g. at the company and the student.

In the discussion, the program coordinators explain that the students often participate in internships in companies with the MBKM program. The students report that they are motivated to get experience outside the university and consider that the off-campus activities benefited their development. In addition, the partners from the industry confirm the experts that the students receive tasks matching their qualifications. All involved parties state that the grading is based on a report organized like a publication and a final presentation. The oral presentation shall give an overview of the performed tasks of the students and allows the supervisors to ask questions for more details and comprehension. The topics of the MBKM activities and its structure are further discussed in the criterion 2.1.

In the discussion, the representatives of the rector’s office confirm that the curriculum of the two study programs “Mathematics” and “Physics” are reviewed every four years. Recent major changes in the program “Mathematics” included the integration of data science in the specialization “statistics” to address modern-world issues and new opportunities on the job market. The program coordinators add that they connect to stakeholders and alumni to review the curriculum. In the Department of Mathematics, the development of the curriculum is based on tracer studies, feedback from the industry and governmental

partners, alumni as well as the guidelines and communication with the Indonesian Mathematical society and within MIPA Net (the network of Mathematics and Natural Sciences). In surveys and discussions, they explain the necessary adaptations improving the program to reach their defined goals. They are considering how to integrate the new development in science and technology in the study programs. One main topic is “big data” which led them to integrate the compulsory courses “Algorithm and Programming” and “Statistics and Science data.” They want to ensure that the students are getting familiar with programming early during their studies. The program coordinators from the Department of Physics state that their reviewing processes are similar; they also consider feedback from various external stakeholders as well as the recommendations of the Physics Society of Indonesia. This society hold annual meetings including open discussions on the curricula in Physics in Indonesia. They add that students and lecturers are invited to give comments on the development of the curriculum. If changes in the curriculum are decided, these are communicated to the teaching staff and students. The last changes in the curriculum of “Physics” included nanotechnology and a stronger focus on digital technology. Upon the questions of the experts if UNILA benchmarks their programs against other universities, they reply that initially, the programs were compared with the Institute of Technology in Bandung, the Universitas Gadjah Mada in Yogyakarta and other top universities in Indonesia. These universities are invited to give feedback on their curriculum in external stakeholder surveys. The teaching staff adds that they also hold curriculum workshops with alumni, industry representatives and final year students to discuss necessary changes in the study programs.

Returning to the topic of data science in the bachelor program “Mathematics”, the experts want to know how strong the connection to the study program of “Computer Science” in the faculty. The program coordinators explain that these programs share some (elective) courses. The topic of data science was already considered in the curriculum; the program coordinators mentions that machine learning and data mining is already included in the current curriculum. The program coordinators explain that they aim to implement programming early in the curriculum to enable to students to get sufficient training until graduation. The experts are further curious about the computer competences of the students in “Physics.” The program coordinators state the students learn to code in C++, which they consider as the most suitable programming language to expand further competences. The lectures are flexible and allow students freedom to apply other programming languages to solve their problems. The program coordinators state that they have recently added a course on artificial intelligence, which is mainly introductory. Students, who want to continue their education in this topic, can take elective courses on modelling and simulations and additional courses from “Computer Science.” They add that some students have al-

ready chosen artificial intelligence as their topic for the final thesis. The program coordinators answer to the expert panel that in the program “Physics.” Moreover, the program coordinators and the teaching staff describe that programming skills are integrated in other lectures in forms of experiments and simulations. The experts are interested if students experience difficulties in learning additional programming languages during their studies. In the experience of the program coordinators, learning new programming languages is not a challenge for the students in the programs “Physics” and “Mathematics.” Since students in “Physics” are already familiar with C++, learning new languages is often considered as being easy, including MATLAB, where students receive a student licenses for free for one year. Another alternative is the programming language Python. Students in “Mathematics” usually continue to use R and Python, which are the main programming languages used in the compulsory and elective courses. The partners from the industry report that their main programming is also done using Python, R and, in some cases, Java. The teaching staff further states their preference for R and Python, as these are open source. They confirm that they are actively trying to integrate programming and new developments in technology into their lectures. Furthermore, they mention that they integrate data, which is publically available; this includes data on health or demography, which are available publically on government webpages. According to the lecturers, these data is freely available online and does not involve complications as using data from the industry. The experts welcome these developments; still, they recommend the teaching staff to remain aware of the most recent developments in technology and data science. Although the experts can see that UNILA has recently placed a larger focus on data science, the experts further want to draw the attention to additional software commonly accepted in the fields of physics and mathematics the students seem not yet familiar. This include above all LaTeX, which should allow the students to write their thesis more comfortably.

The students confirm their high interest in programming and modern technology; they consider their skills as sufficient for finding employment. Despite the university’s recent efforts to include new topics such as programming and big data, the students prefer the university to continue to implement changes to expand the students’ skills in this field. The representatives of the industry also share this point of view; they consider the most recent developments all take place in the data science and modelling. This includes also the program “Physics” where especially the alumni report the need to expand the programming skills for the job market. In their opinion, the students have a strong foundation of the theory, but lack practical skills concerning programming. The experts support the opinion of students and representatives of the industry and recommend the university to track the changes in the field of technology including current hot topics of big data and machine learning in particular.

Concerning the curriculum of the bachelor program “Physics” the experts wonder how students can take a course on “Electronics” without the knowledge of solid state physics or the voltage of diodes. The program coordinators describe to the experts that the students learn the basics on circuits in the modules “Elementary physics I & II.” In contrast, the knowledge on solid state physics is more complex and will be taught later in the curriculum. In the module “Electronics”, the students also receive an introduction to these topics; therefore, the students should have all necessary knowledge to understand this module. The program coordinators add that their structure and content in these modules follows the recommendation by the Physical Society of Indonesia, which is acknowledged by the experts.

The experts learn that general qualifications are included in all curricula; the student receive skills in research methods, research writing and general management. This includes also basic on strategic control, which are important if they pursue a career in the industry. The students also attend a course on “Methodology of research” in which they also learn how to publish research and the ethics of scientific work. The students are required to finish this module before they can start with their final project. Since the students and partners from the industry are satisfied with their competences in research methodology, management and writing, the experts are convinced they learn all the required skills they need on the job market.

The experts are also interested, how the study programs improve the English proficiency of the students. This is of great importance to the representatives of the rector’s office as it is part of UNILA’s strategy to become international. They have included English clubs in every study program to improve the English abilities. Additional courses offer German and Japanese since many students want to study in these countries. The program coordinators add that in addition the mandatory courses in English, students also organize English clubs to have opportunities to practice their English conversation skills. The lecturers also use textbooks and reading materials in English to help the students to improve and prepare them for reading scientific articles for their final project. In the opinion of the program coordinators, the majority of students is able to understand English but have difficulties to talk. Therefore, at the Faculty of Mathematics and Natural Sciences, every Friday is considered “English day” when all conversations on campus should be conducted in English. This includes students and staff. Furthermore, students are encouraged to give their presentations in English. Every two years, UNILA is further organizing international conferences, to which students are invited to contribute. The students confirm that the English skills are very inhomogeneous among students. They appreciate the English course in the first semester and agree that it has increased their level of English. Nevertheless, they confirm that this is not enough for some students, who struggle with the English language. The

students draw the attention of the experts to extra-curricular activities such as English clubs, which are very popular among students and English Friday. Students tell the experts that the lecturers always remind the students to speak English on Friday. Students from the program “Physics” add that they are also involved in a program called “Speaking buddies” which connects them to international students to practice their English conversation skills. The representatives from the industry add that during the internships, students are motivated to give their final presentation in English. The experts acknowledge the different backgrounds of the students and want to draw UNILA’s attention to this issue. They suggest that each lecturer should review their courses and aim to include more reading materials and reports into their classes. This should include laboratory classes (e.g. instructions) as well as presentation materials. To increase the confidence of students in conversations, the experts suggest motivating students to give presentations and discussions in English. In the opinion of the experts, UNILA has already found creative ways to motivate students to talk in English outside the classroom; however, the experts identified the need to work on this issue in a more systematic way.

Furthermore, the experts learn that the updates of the curricula involves internal and external stakeholders. UNILA approaches companies and alumni to comment on the curriculum and make suggestions about the new skills demanded on the job market. Afterwards, curriculum development considers suggestions by members of the department, recent developments in the scientific communities as well as the strategic plan of the university and the government. After drafting upcoming changes in the curriculum, the teaching staff and students are invited to comment. Continuous assessment further influencing the curriculum is based on annual tracer studies revealing the employability of graduates and their competition on the job market. The program coordinators add that the members of their scientific staff are also active members of the Physical Society of Indonesia and the Indonesian Mathematical Society; both organizations hold annual meetings, which include discussions on the important topics of a modern curriculum. Members of their teaching staff regularly take part in these meetings further affecting the curriculum development. In addition, the students are often requesting updates on the curriculum based on their job experience during off-campus activities and part-time jobs in the industry. The students confirm to the experts that they contribute in regular reviews of the modules and are invited to comment on the curricular in general. The students demonstrate a high satisfaction with their current curriculum, which the experts consider as positive.

In conclusion, the experts are confident that the presented curriculum of the programs “Mathematics” and “Physics” allow the students to achieve the intended learning outcomes in order to obtain the degree. They consider the overall objectives and intended learning outcomes for the degree programs are systematically substantiated and updated

in the individual modules. The module descriptions of each course give a clear insight into the knowledge, skills and competences students will acquire. Furthermore, the experts are assured that the curriculum is updated on a regular basis. Nevertheless, the experts recommend implementing English stronger into the classroom to support the students in becoming more fluent and confident. Furthermore, the students should also receive a broader introduction to commonly used software in the respected fields. In the bachelor program “Mathematics” the university should closely monitor the changes in the field of data science in order to implement new methods to meet the demands on the job market. Further, the experts recommend reviewing the specializations in the bachelor program “Mathematics” in order to match international standards. The experts suggest re-grouping them as pure mathematics, applied mathematics and statistics.

Criterion 1.4 Admission requirements

Evidence:

- Self-assessment report
- Academic guidelines
- Webpage UNILA
- Discussions during the audit

Preliminary assessment and analysis of the Experts:

According to the SAR, admission procedures and policies for new students follow the national regulations in Indonesia. The requirements, schedule, registration venue, and selection test are announced on UNILA’s webpage and thus accessible for all stakeholders.

There are three different ways by which students can be admitted to a bachelor’s degree program at UNILA:

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.
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 online test (subjects: Mathematics, Bahasa Indonesia, English, Physics, Chemistry, Biology, Economics, History, Sociology, and Geography).

3. Independent Selection (Mandiri) students are selected based on a test specifically held by UNILA for prospective students that haven not been accepted through SNMPTN or SBMPTN.

The Higher Education Entrance Test Institute (Lembaga Tes Masuk Perguruan Tinggi, LTMPPT) carries out the process of student data collection, registration, and implementation of university entrance selection in Indonesia on the national level. At UNILA, the New Student Admissions Management Agency (Badan Pengelola Penerimaan Mahasiswa Baru, BP PMB) is in charge of carrying out the admission procedure. All information about the requirements, how to register, the stages of the registration process, exam schedules, and announcement of selection results are managed by this agency. All information that is under the responsibility of UNILA can be accessed by the public via the internet.

Undergraduate students at UNILA have to pay tuition fees (UKT). The fees for each study programme vary according to the operational costs of learning. In addition, UKT for each student is different according to the financial ability of their parents. Students with a very poor economic background do not have to pay any tuition fees (class I) and the highest tuition fee (class 8) is IDR 7,950,000 (EUR 506) per year.

Several grants for students with financial difficulties are available, such as from the government, industries, and foundations.

The number of registered students who pass the selection and are accepted at UNILA in the bachelor program “Mathematics” during the last five years are illustrated in the following statistics:

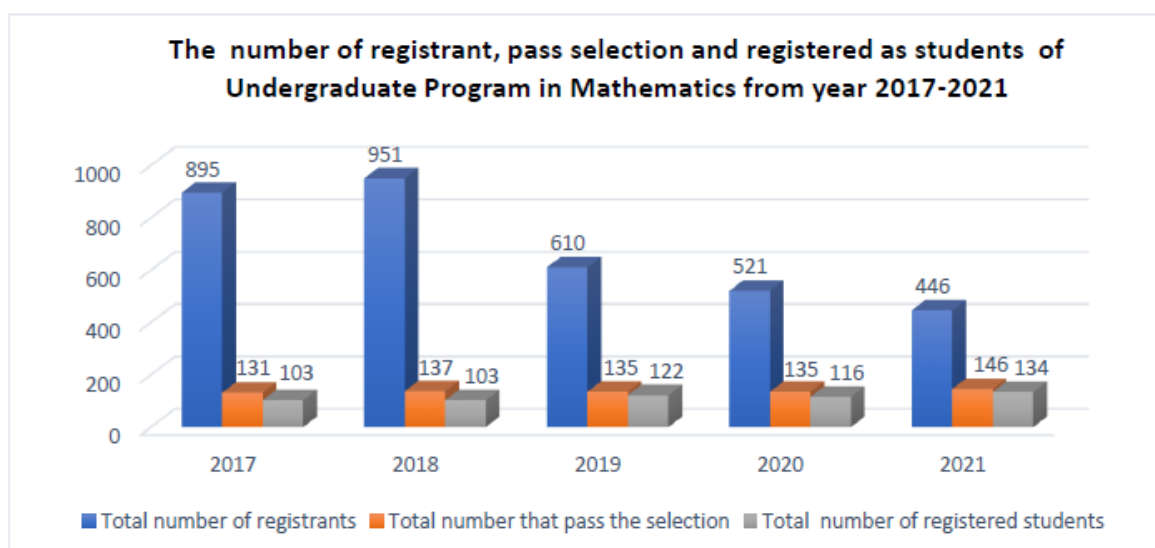


Figure 1: Overview of the numbers of student applications, accepted students and enrolled students in the bachelor program “Mathematics” (source: SAR).

For the bachelor program “Physics”, UNILA has presented the following ratio between registered and accepted students:

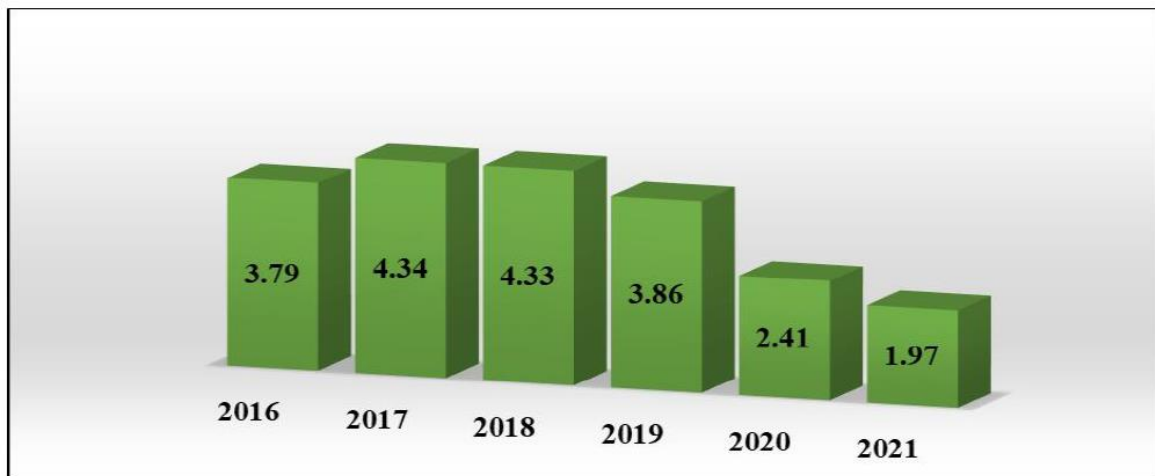


Figure 2: The ratio of registered students and accepted students in the bachelor program “Physics” (source: SAR).

The expert panel inquires if there are any restriction for students with disabilities to enroll in these programs, considering especially previous limitation for colorblind students in programs in “Physics”. The representatives of the rector’s office explain that they currently do not have any colorblind students and do not have any test or criteria by now to exclude those students.

The experts notice that the number of student applications significantly decreased during the last years. The representatives of the rector’s office are well aware about these changes in applications, especially in the program “Physics”. They mention that similar trends exist also at universities across Java. Therefore, this appears to be a cultural issue and a problem with the presence of physics in the society. UNILA has recently participated in a workshop to discuss this issue to develop strategies how to motivate more students to decide to study physics. At UNILA, this also included to expand their collaboration with different companies (environmental companies and medical companies) to demonstrate that physics is useful in many aspects of life. In the program “Mathematics”, alumni are invited to events to talk about their jobs in the different fields of occupation. This should show the different opportunities for graduates of the program “Mathematics” to convince the students to continue their education in this field. Similar ideas are also discussed for the program “Physics”. In addition, the success of the students in “Mathematics” in competitions such as the annual Olympiad further promotes the quality of the study program. Furthermore, UNILA organizes events in schools, including competitions. The experts are interested if the decreasing numbers in applications are connected to competitive universities in the region. The representatives of the rector’s office describe that there are several universities in Bandar Lampung and its surrounding including the State University of Bandar Lampung, the Islamic

University as well as the Sumatra Institute of Technology, which is relatively new. They admit that there are similarities between this institute and UNILA, but currently these universities have many collaborations and share students. Moreover, comparable to UNILA, the numbers in applications for programs in the field of physics are also decreasing. The experts recognize that UNILA is aware of these problems and working towards a solution.

The experts conclude that the terms of admission, the requirements and procedures are binding, transparent and the same for all applicants. UNILA has structured the admission requirements in a way that supports the students in achieving the learning outcomes. There are clear rules as to how individual admission requirements that have not been fulfilled can be compensated.

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

Ad criterion 1.1

In its statement, UNILA provides evidences that that have already started to request to change the awarded degree in the study program “Mathematics.” The submitted letter proves, that UNILA has already taken action to change the “Bachelor of Mathematics” to “Bachelor of Science.” The experts are satisfied with the submitted documentation and therefore delete the recommendation on this topic.

Furthermore, the experts are convinced that UNILA is supporting their students to receive competences in entrepreneurship. UNILA presents that the curriculum contains two courses where students learn how to develop a business plan and receive an introduction to management and marketing. The experts consider this an important contribution to the student’s employability and do not issue any recommendation in this regard.

Another topic discussed in the statement by UNILA are the tracer studies. UNILA has presented screenshots of their most recent update in the tracer studies. In the opinion of the experts, the new presented options in the questionnaire allow the alumni to select suitable choices, which should represent their current employment states and avoid any misunderstanding. However, the experts suggested deleting the option “I’m married” since they are uncertain how this relates to the employment status of this person. The experts do not issue any recommendation or requirement on this issue.

Ad criterion 1.3.

UNILA describes in their statement their motivation to divide the specializations in the study program “Mathematics.” Nevertheless, the experts consider that a division in “pure mathematics”, “applied mathematics” and “statistics” is the internationally accepted version. They suggest that this should also be included into the diploma supplement if possible to allow the employer to quickly recognize the students’ qualifications. Therefore, the experts continue to issue a recommendation (recommendation E8”).

The experts highly appreciate that UNILA has already conducted their first workshop for LaTeX. Although the experts can also see the good motivation by UNILA to improve and teach students internationally accepted software, they continue to issue the recommendation E2. First, they would like to remind UNILA to establish the use of these programs in their study programs and thus continue to give workshops and second, they wish to include additional software useful in these study programs. As examples, the experts list open source products like UNIX, LaTeX, R, Python, Gimp and others.

UNILA has provided evidences in their statement demonstrating their effort to improve the English proficiency of their students. They consider that UNILA has taken the first steps to allow the students to become fluent in English by supporting them in doing their presentations in English and writing their final thesis in English. They acknowledge the achievements of individual students. However, the experts consider, the students need more training in English to become fluent and confident to speak in English. According to the experts, this should take place inside the classroom and not in extra-curricular activities. Therefore, they encourage UNILA to continue to include English into the classroom. The recommendation E1 remains in place.

Furthermore, the experts further issue the recommendation E9 proposing UNILA to closely follow the development in science and technology in order to implement recent changes into their courses.

2. The degree program: structures, methods and implementation

Criterion 2.1 Structure and modules
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Evidence:

- Self-assessment report
- Curricular overview of each study program
- Module handbook of each study program

- Objective-module matrix of each study program
- Statistical data on students and their study progress
- Discussion during the audit

Preliminary assessment and analysis of the Experts:

In the bachelor study programs “Mathematics” and “Physics”, the students have to complete at least 144 Indonesian credit points (SCU). The standard study time for the bachelor programs is eight semesters. The study programs under review comprise compulsory (38 courses or 89 SCU) and electives modules (42 courses or at least 55 SCU). The compulsory courses can further be classified as university, faculty and study program modules whereas electives modules are specific for each study program. The structure of the curriculum divides the workload for the students into eight semesters, in which the students shall reach the intended level of proficiency and skills. In general, the study plan considers a workload of 18 to 22 SCU with the exception of the eighth semester, where the students focus on their final project (four SCUs). The final project and the following final thesis or bachelor thesis are compulsory.

The structure of the bachelor program “Mathematics” and “Physics” consider the following courses based on credit points:

Table 1: The percentage of minimum course by type and course load required to graduate in the bachelor program “Mathematics” and “Physics” (source: SAR).

Requirement level	Course Credit (SCU)			ECTS	%
	Compulsory	Elective	Sum		
University	17	0	17	27.20	11
Faculty	4	0	4	6.40	3
Degree program	89	34	123	196.80	86
Total	110	34	144	230.4	100

The curriculum of the bachelor study programs “Mathematics” and “Physics” allow students to collect credit points from activities outside their main study programs. One option for the students is to participate in the Independent Learning-Independent Campus or Merdeka Belajar-Kampus Merdeka program (MBKM).

Off-campus learning can be achieved within several different activities: (1) certified internship with government, non-government institutions, companies or industries, (2) student exchange, (3) thematic student study service, (4) independent study, (5) research in collaboration with lecturer, government, non-government institutions, companies, or industries, (6) humanity project and (7) entrepreneurship.

The students are allowed to take courses outside their study program in other study programs at UNILA. These courses should not exceed 12 semester credit units (SCUs). Alternatively, students can choose to take courses in a study program “Mathematics” at other universities with the same amount of 20 SDU. Students are required to finish the basic scientific courses before taking modules from other study programs or universities. Furthermore, UNILA allows the students to choose internships with a duration of either one month or one semester. During the internship, two supervisors, one from the university and one from the institution offering the internship (company, research institute, etc.) will evaluate the students.

Concerning incoming students, the representatives of the rector’s office confirm to the experts that there is currently one international student at the Faculty of Mathematics and Natural Sciences, who is studying in the program “Computer Science.” UNILA is opening scholarships for foreign students to increase the number of incoming degree-seeking students.

In the discussion, the experts learn that students enjoy taking part in the MBKM program to get experience outside campus. The program coordinators explain that the conversion of MBKM activities to credit points is well structured as the MBKM is limited to elective courses. The students discuss with their UNILA supervisor, the head of the department and possible industry supervisor before participating in their off-campus learning. It is mandatory to agree on the learning outcomes and the type of activities prior to the outside campus stay. During the off-campus activity, the students need to report on their activities every day. This work diary is the basis for the conversion to credit points and allows the academic supervisor to monitor the students’ activities and their progress. The experts additionally learn that the students are supported by the university in applying for the opportunities off-campus; however, the industry partner needs to accept the application. UNILA offers collaborations with agencies and companies, allowing a regular exchange of students for internships. The list of companies is published on the university webpage. Additional offers are usually distributed among students by email and whatsapp groups. Nevertheless, it happens that students cannot find a suitable internship. In these cases, the university has already offered them assignments in the laboratory to allow them to gain more practical experience. The students explain to the experts that the grades of the off-campus activity requires them to apply competences they have previously learned on campus. Afterwards, the students are required to write a report on their scientific activity during their internships. The experts raise the question on how to find a suitable internship. All students have chosen companies, which had previous relationships with UNILA and had accepted students in the past; they consider their internship as highly beneficial for their learning process and personal development. Most students took part in the internships at the end of

the fifth or sixth semester, which usually lasts for 40 days according to the representatives of the industry. The students report to the experts that they took their internships to get practical experience in schools, companies and to gain additional certificates. However, the students mention to the experts that they did not receive a list of companies from the university before applying for internships. The students explain that they usually work to gather research data during their internship, which they can integrate into their final project. In some cases, the students did receive a list of potential thesis topics connected to internships; nevertheless, none of the available topics matched their research interest. The students therefore express their opinion that the university should expand their connections to the industry in order to offer the students a broader scope of internship topics. The partners from the industry state that they offer collaborations including small research projects. Additionally, they give presentations at the university in order to advertise their internships. In general, the partners from the industry would appreciate if the students would take part in a mandatory internship in earlier semesters to give them a direct insight into companies and support them in selecting their profession. The experts value the effort of the partners from the industry to support the study programs; nevertheless, they share the students' opinion and recommend the university to search for new cooperation partners matching the topics addressed in their curriculum. The experts also identify a problem in communication between the lecturers and students in finding companies; even though there seems to exist a webpage to give more information, some of the students report problems in finding this information. The experts therefore suggest offering structured information to the students at an early stage in their studies, so that they know the basics of the MBKM program and know where to look for internship opportunities.

The students further discuss the supervision during their internships. They claim that their university supervisors did not visit them in person during their internship as many did their internship in Jakarta or other cities across Indonesia. However, the students confirm that a close contact existed with their academic supervisor due to weekly reports showing their tasks and activities. In addition, the academic supervisor is in regular contact with the company advisor. This might also include online meetings with the student to discuss the most recent developments.

The experts inquire how UNILA ensures that the students have to perform tasks suitable for their qualifications. The program coordinators confirm to the experts that the academic supervisor meets with the field supervisor to check on the students' work and progress. Because of their monitoring with the students daily activities, they are certain that the students work on the required tasks agreed on prior to the off-campus activities. The academic supervisor always makes sure, that the working environment is prepared for the students.

This includes the access to suitable devices, e.g. computer and a desk in the field of mathematics.

International student exchange takes place in the bachelor study program “Physics” and “Mathematics” according to the program coordinators. For exchange programs of one semester or more, students usually apply for governmental funding to financially support their mobility. In the program mathematics, students are currently in France while other will go to the USA in the next semester. A high number of students in both programs further stays in Malaysia during their exchange, where UNILA currently tries to establish an organized student exchange program. In addition, many students participate in student exchange programs within Indonesia or use the MBKM program to take courses outside UNILA. The program coordinators confirm to the experts that externally acquired credits are fully recognized. The students state to the experts that the conversion of credits from outside campus is well established. However, the students wish from the university to expand their international cooperations to enable them to take part in international exchange easier. In their opinion, this should include more universities from across the globe to broaden their study experience.

In conclusion, the experts confirm that the two study programs under review are divided into modules, where each module is a sum of teaching and learning whose contents are concerted. The experts consider that the choice of modules and the structure ensure that the learning outcomes can be reached within the established timeframe. UNILA allows students to define an individual focus and course of study by integrating off-campus learning such as student mobility and work experience. The university ensures that each module objectives helps to reach both the qualification level and the overall intended learning outcomes. Although the university could present evidence that the internship is well integrated in the curricula of the two programs under review, the experts consider that the university should widen its connections to the industry to offer a higher diversity in internships. This should also include a stronger support of the students finding suitable internships by providing more detailed information. Moreover, the experts recognize that there are programs in place, which allow the students to take part in courses at other universities and institutions. However, the experts recommend the university to expand its collaborations with other universities to facilitate student exchange for an entire semester. However, the experts confirm that UNILA has established rules for recognizing achievements and competences acquired outside the higher education institution. Still, the experts recommend the university to improve their collaborations with the industry. This should give the students a broader option to get practical experience in companies. In addition, the experts also emphasize the importance for students spending time at other universities. To

facilitate the student exchange, the experts recommend providing structural support from the university to increase the motivation of students to go abroad.

Criterion 2.2 Workload and credits

Evidence:

- Self-assessment report
- Module handbook of each study program
- Conversion calculations of SCU to ECTS credit points
- Curricular overview
- Discussion during the audit

Preliminary assessment and analysis of the Experts:

Based on the National Standards for Higher Education of Indonesia (SNPT), the Bachelor's degree programs under review use a credit point system called SCU.

For regular classes, one SCU of academic load for the undergraduate programme is equivalent to three academic hours, which equals 170 minutes. This includes:

- 50 minutes of scheduled contact with the teaching staff in learning activities,
- 60 minutes of structured activities related to lectures, such as doing the assignments, writing papers, or studying literature,
- 60 minutes of independent activities outside the class room to obtain a better understanding of the subject matters and to prepare academic assignments such as reading references.

For lab work, final project, fieldwork, and other similar activities, one SCU is equivalent to three to five hours a week of student's activities. The details and the students' total workload are described in the respective module description.

In comparison to the European Credit Transfer and Accumulation System (ECTS), wherein one ECTS credit equals 25-30 hours of students' workload, it is determined that one CP is awarded for 170 minutes of work per week. One semester usually consists of 14 lecture meetings. The students' workload (contact hours and self-studies) is measured in Indonesian credit points (SKS), and converted to the ECTS. According to the legal requirements, the actual number is 144 SKS (230 ECTS) for the Bachelor's degree programs.

Table 2: Conversion calculation of SCU and ECTS (source: SAR).

Semester Credit Unit	Conversion calculation	Explanation
1 SCU	$1 \text{ SCU} = 170 \text{ min/week/semester}$ $= 170 \text{ minutes} \times 14 \text{ weeks}$ $= 2380 \text{ minutes} = 39.7 \text{ hours}$ $1 \text{ SCU} = (39.7 \text{ hours} / 25 \text{ hours}) \times \text{ECTS} = 1.6 \text{ ECTS}$	<p>One credit (1) SCU in the learning process is in the form of lectures, responses, or tutorials which consists of:</p> <ul style="list-style-type: none"> a. Learning process activities 50 (fifty) minutes per week per semester; b. Structured assignment activities of 60 (sixty) minutes per week per semester, and c. Independent activities 60 (sixty) minutes per week per semester <p>One (1) semester = 16 weeks (including Mid-semester exam and Final Semester exam)</p> <p>One (1) semester = 30 ECTS</p> <p>One (1) ECTS = 25 – 30 hours. Taking the minimal standard, then one (1) ECTS = 25 hours.</p>
144 SCU	$= 144 \times 1.6 \text{ ECTS} = 230.4 \text{ ECTS}$	

The experts raise in the discussion the calculation for the total workload of the students considering contact and self-study hours. The program coordinators state that by governmental regulations, the students can only take up to 14 credits per semester. Their workload is officially established for each credit point. The lecturers consider the determined workload per credit point when establishing the workload necessary to achieve the learning outcomes for each module. In their module evaluation, the students are asked how much time they needed to complete this module in order to verify the credit point estimate. The students are generally satisfied with the workload during their studies. They explain to the experts that they receive a clear overview on all tasks and assignments of each module at the beginning, which gives them the possibility to schedule their semester. They further mention that the lecturers are approachable if they encounter problems in their assignments, which helps them to stay in the schedule for their assignments. The students confirm that they consider the workload mainly as accurate; however, they report to the experts that they are not asked if the calculated workload is accurate with respect to the time they spend on each module. In the opinion of the experts, the university needs to provide methods to verify the workload of these modules. They advise the university to

reconsider the students' questionnaires at the end of the semester to include questions on the actual workload of the students. This should allow them to confirm the number of credits is indeed accurately matching the student workload.

In the discussion, the students also mention that some students are able to finish their studies in seven semester and thus below the average study time of eight semester. In these cases, students take up to 24 SDU per semesters. They admit that this is exceptionally fast but still possible considering the assigned workload of the modules. The experts acknowledge that gifted students can progress faster than indicated and that average students are able to finish their studies in time. They ask the students what might prolong the study time in both programs under review. The students consider the student mobility as one main factor, which extends their study time as it disturbs their study process. From the program "Physics", they consider the final project the hardest part to complete in time. If students choose to do research outside the university, the research follows the regulations of this institute/laboratory. This is only the case, if the students take part in advanced research, which is on a voluntary basis. If they decide to do their final thesis, then the final thesis is not an obstacle for finishing their studies in time. In the program "Mathematics" the situation is similar when the students decide to gather data outside the university.

Furthermore, concerning the activities within the MBKM programs, the students consider the conversion of their off-campus activities to credit points as fair; they are not aware of any problems in their cohorts and study programs during the last year. They add that during the first years of the MBKM program, some credits could not be converted since UNILA has not established the process in detail; especially the internship is out of the scope of the study program. Nevertheless, these programs were solved since. The experts are pleased to hear this and see the credit point system as established.

Based on the data of the average duration of their studies, the experts are aware that most students take longer than the eight semesters. The representatives of the rector's office note that based on their surveys, the students remain in study time until they start their bachelor's thesis, for which many take more time than expected. They explain that in the programs "Mathematics" and "Physics", the final thesis is six SCU in total, which includes three steps (1) proposal writing (once SCU), (2) proposal seminar in the 7th semester (one SCU) and (3) research (four SCU). The research work should be completed within six months. The representatives of the rector's office consider that the workload matches the actual work of the students. In order to allow the students to learn new topics such as artificial intelligence and the Internet of Things, the program coordinators have requested to decrease the total amount of workload for the final thesis to only four credits. However, these changes were not accepted by the university leaving the workload of the final project in both programs at six credits considering the module and seminars. The students explain

to the experts that they usually finish their final thesis in three months. The experts are satisfied to hear that the students consider the workload of their final thesis as possible within the established timeframe. Nevertheless, the experts ask the university to review the assigned credit points to the final thesis and the real workload of the students. The experts remark that the workload of the thesis should be split with the attached seminars to establish fair conditions for the students to finish their studies in time.

In general, the experts consider the estimated time budgets presented by UNILA are realistic enough to enable students to complete the degree without exceeding the regular course duration. Structure-related peaks in the workload have been avoided. The experts confirm that UNILA is operating a credit point system oriented on the amount of work required from students. Nevertheless, the experts consider that the actual workload divided into contact hours and self-study time needs to be independently verified. The experts recommend the university to review the actual workload of each module by asking students and reassess the workload of the module and the entire semester if necessary.

Criterion 2.3 Teaching methodology

Evidence:

- Self-assessment report
- Module handbook of each study program
- Discussions during the audit

Preliminary assessment and analysis of the Experts:

According to the SAR, every lecturer is responsible for choosing the most suitable teaching methods and learning tools in their course. UNILA distinguishes between the learning on campus with the study programs and the learning within the MBKM program.

The learning method applied in the two programs under review is a combination of teacher-centered learning such as classroom teaching/tutorials, demonstrations, and laboratory sessions, and student-centered learning such as seminars, Community Service, field studies, laboratory work and Thesis. Each course can use one or a combination of several teaching and learning methods.

The most common methods of learning are lectures, with several courses having integrated laboratory work. Lecturers generally prepare presentations to support 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. Laboratory work covers laboratory preparation, pre- or post-tests, laboratory exercises, reports,

discussions, and presentations. In addition, practical activities should enable students to be acquainted with academic research methods. Learning in laboratories also includes computer labs, where students are trained in using software such as Python, GNU Octave, and R.

The experts raise the topic of inverted or flipped classroom teaching methods. In Physics, the program coordinators state to apply this method regularly. They often define student groups and assign them a chapter; the students need to present this chapter to the entire class and the rest is encouraged to join a discussion and ask questions. Lecturers often ask guiding questions and additionally answer questions by all students. They enjoy this kind of teaching to involve the students in the course. The presentation is organized as a group to train the students' soft skills including their problem-solving skills. The teaching staffs continue that team-based projects usually involve groups of three to five students. During the project, students have to give presentations on the progress, which affects the grade of the project. Each students have to give a presentation once; therefore, the presentation material is divided. The team-based projects can last up to eight weeks. The final grade of the students of these projects might differ depending on their presentation and contribution to the project. The experts support the implementation of these methods into the study program and suggest the university to consider it for all study programs.

The experts further address the lecturers' experience during the COVID-19 pandemic; the teaching staff reports that they have also used zoom for their virtual teaching. This included uploading slides and reading materials online for the students. In addition, they produced teaching videos for YouTube as instruction videos as well as interactive videos, where students have to answer questions to prove they have watched the video and understood the content.

The teaching staff adds that in general class sizes are limited to 30 students in elective courses with exceptions of smaller classes limited to 20. In compulsory classes, the student number generally ranges between 35 and 40 students. The minimum number for elective courses is three students in order to hold the course.

The experts confirm that the applied teaching methods and instruments support the students in achieving the learning outcomes. The modules are considered a good balance between attendance-based learning and self-study; additionally, the university allows the students to get familiar with independent academic research and writing plays a vital role in the program. The experts gain the impression that on an individual basis, the lecturer already integrate modern teaching methods; still they recommend the university to foster the use of new methods and encourage teaching methods such as "inverted classroom." In order to increase the English proficiency of the students, the experts recommend this

method also in English language. In addition, they advise the university to reduce the number of students in group work in the laboratories to ensure every student is able to get sufficient practical experience.

Criterion 2.4 Support and assistance

Evidence:

- Self-assessment report
- UNILA academic guidelines
- Discussions during the audit

Preliminary assessment and analysis of the Experts:

UNILA offers a comprehensive advisory system for all undergraduate students. This includes centralized sources of student support as well as individual support for each student.

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 a number of students. They act as the student's first contact 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 skills development and help if there are problems with other teachers.

In the first week of their studies, students further receive information during an orientation week event. This explains the university's organizational structure, facilities, programs, academic life, etc. Welcoming speeches are given by the rector as well as the heads of the departments and study programs. The head of the study programs further act as support for the students in academic and administrative issues. Peer tutors give additional academic support during laboratory classes.

Moreover, the dean of student affairs organizes events to support the students. These include science fairs, student creativity competitions, and scientific writing competitions. Further support is given by the Center for Career and Entrepreneurship Development at UNILA. This is responsible for providing information on job vacancies, career guidance and coaching, psychological assessment and alumni contacts. A 5-member team at faculty level provides student support in non-academic issues. Students are required to fill out a form online in order to get in contact for support.

All students at UNILA have access to the digital academic information system (Sistem Informasi Akademik, SIAKADU). The students' profiles (student history, study plan, academic transcript and grade point average/GPA, lecturer evaluation, course list) are available via SIAKADU. In addition, course materials and supporting documents compiled by the lecturers are provided via SIAKADU.

The experts confirm that UNILA provides resources for individual assistance, advice and support for all students. The allocated advice and guidance (both technical and general) on offer assist the students in achieving the learning outcomes and in completing the course within the scheduled time.

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

Ad criterion 2.1.

UNILA describes in its statement how students usually choose places for their internship and how they receive information. The experts can already recognize that UNILA provides support for the students for their practical off-campus learning; nevertheless, they suggest continued improvement. They already appreciate the webpage of the study program "Physics" and recommend establishing a comparable webpage also for the study program "Mathematics." In addition, it is important that students have access to information on taking the internship early on in their study processes. In the understanding of the experts, the "orientation" mentioned by UNILA in their statement takes place right before the internship. In contrast, the experts suggest establishing information material, which students can access any time during their studies in order to consider taking part in an internship. This should help the students to individually plan the internship and match it to their study plan. Furthermore, the experts continue to recommend UNILA to search for new collaboration partners offering student internships, especially in the private sector. The experts confirm this issue by the recommendations E3 and E5.

The experts approve that UNILA will continue to search further for partner universities to conduct formal student exchanges based on MoUs. The recommendation E4 remains in place.

Ad criterion 2.2.

During the on-site visit, the experts were especially concerned about the workload of the students for the final thesis and therefore suggested UNILA to include two seminars. UNILA has already implemented the suggested modifications and shown evidences of the revised

curriculum. The experts acknowledge these changes and do not issue any requirements or recommendations on this topic. Moreover, UNILA describes in their statement a newly developed feature, which allows them to track the student workload online. The experts appreciate this development; nevertheless, they recommend UNILA to test this tool and verify whether the awarded credit points actually match the workload of the students. This should also confirm whether the new tool is suitable to estimate the total student workload in the future. Therefore, the experts confirm this issue by the requirement A1.

Ad criterion 2.3.

The experts approve UNILA's documentation on including teaching methods such as "inverted classroom." In the opinion of the experts, it is highly beneficial for students and UNILA to continue to experiment with this method. The experts consider it an excellent opportunity for students to prove their English conversation skills. Therefore, they still recommend E6.

UNILA further describes how they aim to accompany teams of three students in the laboratory work in the study programs, especially in "Physics." The experts understand that a reduction of the student number is challenging due to the limitation of available equipment. The experts acknowledge that a reduction of the size of the student groups during laboratory classes would therefore lead to an extension of lab courses. The experts are aware of the complications of this recommendation. However, they decide that the recommendation E11 remains in place. The experts remind UNILA, that this recommendation is a goal for the entire accreditation period of five years and does not have to have an immediate impact and could also take place once more equipment is available.

3. Exams: System, concept and organization

Criterion 3 Exams: System, concept and organization
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Evidence:

- Self-assessment report
- Module handbook of each study program
- Appendix Assessment principles
- Examples of exams
- Examples of final thesis

- Discussions during the audit

Preliminary assessment and analysis of the Experts:

According to the SAR, the exams in the two study programs under review are prepared to assess the achieved competences of the students in respect to the intended learning outcomes of the module. In the SAR, UNILA describes the following principles: “The principle of assessment includes several principles. Firstly is the educative principle, which means an assessment that can motivate students to be able to improve planning and learning methods and achieve Programme Learning Outcomes. Secondly, the authentic principle, which means an assessment, is oriented towards a continuous learning process and learning outcomes that reflect student abilities during the learning process. Thirdly, the objective principle, which means that an assessment is based on a standard, which are agreed between lecturers and students and which is free from the influence of the subjectivity of the assessment. Fourthly, the principle of accountability, which means that the assessment is carried out in accordance with clear procedures and criteria, agreed at the beginning of the lecture, and understood by students. Fifthly, the transparent principle which means an assessment whose procedures and assessment results are accessible to all stakeholders.”

The assessment in the modules considers various methods. The first method of assessment is based on observation, participation, performance, written tests, oral tests, and questionnaire during the duration of the module. This allows the lecturers to observe competences like attitude and a continuous assessment of the knowledge as well as general and specific skills of the students. The assessment further considers structured assignments, practical exams, team-based projects as well as mid-semester exams (UTS), and final semester exam (UAS). Students are required to attend at least 80 % of the lectures to take part in the final exam and have to participate in all practical activities.

UNILA has issued the following guidelines for composing the final grade: 10% participation in the class, 40% team-based project, 10% structured assignment, 10% quiz, 10% mid-semester test and 20% final-semester test. The form of each exam and potential variation in the grading is mentioned in the module descriptions that are available to the students via UNILA’s homepage and the digital platform SIAKADU.

The assessment of field works or internships follow different criteria. Students are required to write reports, which will later be evaluated by their two supervisors. Students also have to participate in the student community service. In this course, the field supervisors of the program will based the grade on the interaction of the students with the community.

UNILA has further included these guidelines for quality marks in their SAR:

*Table 3: Guidelines for graded assessments. ** C+ is declared conditional pass if the course is taken on Semester Antara. Semester Antara is semester that only lasts for 2 months where the number of meetings in one week is twice that of a*

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*regular semester. Semester Antara is usually held in early July and ends at the end of August in the same year. *** D is declared conditional pass if the course is taken on Regular Semester (source SAR).*

Final Score (0-100)	Quality Letters/Grade	Quality Number	Status Rating
Study Program Diploma/Bachelor/Applied Bachelor/Professional			
Score ≥ 76	A	4,0	pass
$71 \leq \text{score} < 76$	B+	3,5	pass
$66 \leq \text{score} < 71$	B	3,0	pass
$61 \leq \text{score} < 66$	C+	2,5	pass**
$56 \leq \text{score} < 61$	C	2,0	pass**
$50 \leq \text{score} < 56$	D	1,0	pass***
score < 50	E	0,0	not pass

Assessment of the student activities in the MBKM program, student can earn up to 40 SCU outside the university, limited to 20 SCU outside the study program. Grades from other study programs and institute will be accepted and marked as such in the transcript of records.

Students also have to work on a final project and write a compulsory final thesis (bachelor thesis). The thesis follows the steps of the flow chart presented by UNILA in the SAR:

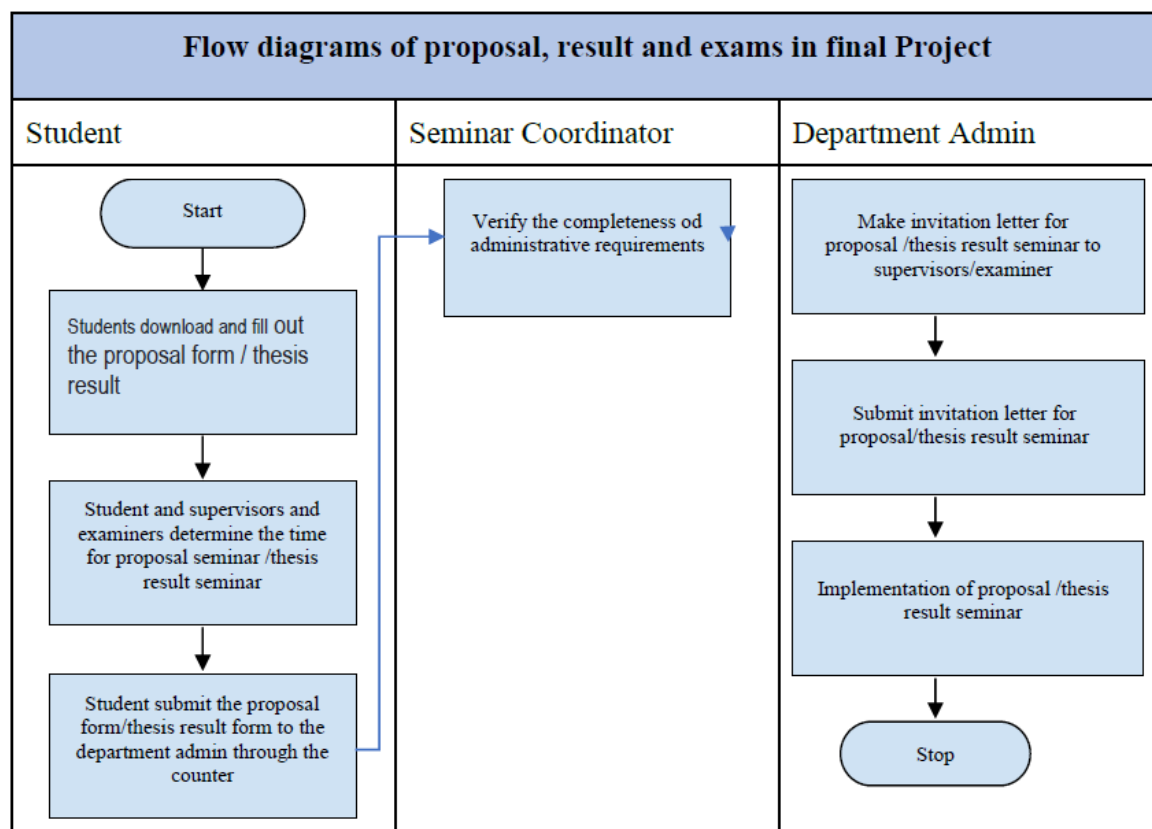


Figure 3: Flow diagram of progress through the final seminars and final thesis (source: SAR).

The assessment of the final project is based on the following criteria: (1) mastery of materials/methods 30%, (2) scientific attitude and argumentation 10%, (3) presentation and linguistic techniques 10%, (4) originality 20%, (5) relevance and cohesiveness 15%, and (6) writing 15%.

The experts are interested on how many students fail exams in the first semester in the programs “Mathematics” and “Physics.” The program coordinators describe that the number of failed exams in the first semester in both programs is low. Because they integrate various forms of assessment and exams during the semester, the students learn to improve through their time at the university. The program coordinators admit that the number of students receiving a “C” during their first examination is higher; however, the majority of students improves. At the end of the semester, less than 10% get a “D” at the end of a course. The experts are satisfied with this first year success rate of the students. In the discussion with the students, they confirm that it is uncommon to fail a module due to the different components of one module. Usually, if one students fails in one component, they are successful in another. This balances their final grade and allows them to proceed with their studies. In their opinion, less than 5% of students fail one module; this means, that the students have to take the course again. Most students use the shorter summer semester to repeat their courses.

Concerning the quality of the exams, the program coordinators of the program “Physics” confirm that they collect the exam questions each semester and make an assessment report. This includes the PLOs of the module to verify the questions contribute to the achievement of the PLOs. Every lecturer has to submit their assessment report every semester, which is then discussed during a meeting. In the program “Mathematics”, most courses use team teaching; therefore, a close cooperation among the lecturers is obligatory. This includes matching teaching materials, presentations and examinations. Usually, they teach several classes at the same time using identical materials; each lecturer is always verifying the other lecturer(s) in their team. This is supported by the teaching staff. The teaching staff from the program “Physics” add that they also use team teaching, where the material of one module is split in three groups. The team ensures that the questions match the PLOs and are in accordance with the teaching materials shared with the students.

The program coordinators further describe that students are welcome to ask for feedback and take a look at their examinations. The students are welcome to receive personal feedback. In addition, students can appeal the results, which starts a process or re-considering the final grade. The official process involves the dean or the vice-rector of student affairs, who discusses the case with the head of the study program as well as the student and lecturer in question. In most cases, however, the students are satisfied with an explanation and feedback on their achievements. The students confirm this situation. One student reports in the discussion that they once have received a wrong score in their examination, which they discussed with their lecturer directly. In this case, the problem could easily be resolved. They mention that they receive their scoring sheets to ensure a transparency of the results, which enables them to easily appeal the results with their lecturers. They comment that they are further aware of the process of a formal appeal, which involves the submission of a special form.

The experts further want to know if UNILA has a regulation concerning illness or compensation for students with disabilities. The program coordinators state that there is the possibility to postpone the exam when a confirmation from a doctor is provided. They also have regulations for students with disabilities based on the governmental regulations that ensure that every student is allowed to join each study program. In their admission system, each student can mark their need for special requirements for which the university is required to provide solutions. The university is currently working on extending their barrier-free campus. The students know of past examples of students getting sick on an examination date; these students were allowed to repeat the exam within two weeks after the initial examination date. However, the students mention that this differs between lecturers and the explanation given for staying away from the exam. Although the university seems to handle cases of students missing examinations due to illness, the experts are concerned

that this is decided on an individual basis. The experts therefore recommend establishing a policy, which allows the students to miss an exam in case of illness to give the students equal rights to re-take examinations. This should also clearly state the steps students have to take in order to excuse themselves from an examination.

The experts remark that the final thesis has only four Indonesian credits, accompanied by two for the seminar (one seminar for the proposal for the final project and one seminar to discuss the results of the project). The experts consider the amount of six SDU still low for the final project considering the total workload for the students. See further discussion in criterion 2.2. In the discussion, the program coordinators describe to the experts, how the final thesis is organized. Within the Department of Mathematics, bachelor students are motivated to write their final thesis in English; however, the number of English theses is still limited.

The experts learn that the exams in the two study programs are designed to individually measure to which extent students have reached the defined learning outcomes. Exams are structured to cover all of the intended learning outcomes (knowledge, skills and competences). Each exam is module-related and offers students feedback on their progress in developing competences. The applied forms of assessment are clearly presented in the module handbook, which is available online and also informs them on the requirements to pass the course. In addition, the experts learn that the two study programs involve a final thesis (bachelor thesis), which ensures that students work on a set task independently and at the level aimed for. Although exceptions were made for students in the case of illness or disability, UNILA has not yet defined any rules and regulations for such cases. Therefore, the experts suggest that the university works on such regulations, and informs the students about their rights and duties in case of illness and other circumstances. Moreover, the number of exams and their distribution across the semester ensures that the exam load and preparation time is adequate. The experts verify that all exams are marked using transparent criteria, which ensure that exams marked by different examiners are comparable.

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

UNILA's statement did not contain any information on the exam regulations. Thus, the experts issue the requirement A2, which calls UNILA to establish examination regulations in case of illness.

4. Resources

Criterion 4.1 Staff

Evidence:

- Self-assessment report
- Staff handbooks
- Discussions during the audit

Preliminary assessment and analysis of the Experts:

All lecturers at UNILA are employed as civil servants; therefore, they have to teach, perform research, and participate in community service. Additionally, all scientific staff is involved in student support. Recruitment policy requires new lecturers to have at least a master's degree as a minimum qualification.

The scientific staff of the Department of Mathematics is responsible for teaching in the bachelor program "Mathematics." Currently, the scientific staff contains 24 members of whom 13% have the rank of professor, 33% are associate professor and 54% are assistant professor. Of the academic staff, 54% have completed their PhD, whereas 46% currently hold a master degree. Of those with a master's degree, eleven lecturers are pursuing a doctoral degree. Of the scientific staff in the Department of Mathematics, 54% are male and 46% are female.

The qualifications of the scientific staff of the Department of Mathematics cover the three specializations in the programs; the fields of algebra, combinatorics, operations research, analysis and applied mathematics, and statistics. Each of these specializations is related to one research group. These research groups perform research and service activities, in which students are involved. The staff members have successfully competed for external grants for research and community service at governmental funding agencies. Despite a short decrease in awarded grant money, the funding capabilities are rising since the end of COVID-19. These lead also to a constant output in scientific research publications, including 72 international articles during the years 2018–2021.

The number of scientific staff members in the Department of Physics is currently 19, consisting of 68% female and 32% male lecturers. Of them, six hold a doctorate while 13 have a master's degree. In 2019, UNILA hired three new lecturers for the bachelor program "Physics" to support the increasing number of students. Of the entire academic staff, two have reached the level of full professor, whereas four are associate professors and 13 assistant professors.

The research activity can be divided into the three specialization or groups. The largest research funded was awarded for the group in “Material Physics” with smaller external grants won by “Energy Physics” and “Instrumentation.” The number of published research articles was continuously increasing during the last years. In 2021 alone, the Department of Physics published 27 articles in indexed international journals.

The representatives of the rector’s office explain to the experts that the government needs to open a call for them to be able to hire new staff members. Usually, the academic staff is looking out for gifted students and the best graduates to encourage them to apply to continue their higher education. The opening of new positions is linked to the total number of students and the ratio between staff members and students; thus, it is currently nor possible to open new positions in Mathematics or Physics. The teaching staff admits that they often receive applications by people holding a master’s degree. If these people are hired, the university supports them to pursue a PhD. The head of the department usually meets with them to discuss a plan for them to continue their studies.

The teaching staff explains to the experts that they follow the governmental regulations concerning their teaching load. The government stipulates 12–16 hours of teaching per week. The teaching staff adds extra hours of teaching occur and are paid by the university. They admit that the average teaching load is around 15.3 hours per week, which is considered high. Next to their responsibilities in teaching, each lecturer needs to contribute to community service, student supervision and research. In their opinion, they have enough time for research, which allows them to fulfill the requirement to publish one international article every three years. Their workload allows them to submit applications for research funding and publish; in some cases the publications are a joint work with students including students from the undergraduate programs under review.

The experts conclude that the composition, scientific orientation and qualification of the teaching staff team in the two bachelor programs under review are suitable for sustaining the degree. In the opinion of the experts, UNILA offers sufficient staff resources to provide assistance and advice to students and complete administrative tasks. In addition, the teaching staff is able to conduct research and development to support the level of academic qualification aimed at.

Criterion 4.2 Staff development
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Evidence:

- Self- assessment report
- Staff handbooks

- Discussions during the audit

Preliminary assessment and analysis of the Experts:

UNILA actively supports the staff development through coordinated activities and programs. It organizes pedagogic training, which covers courses on character-building, applied approach and e-learning techniques. In addition, language courses in English are provided.

Lecturers holding a master's degree are actively encouraged to continue their higher education. The support includes provision of seminar incentives, provisions of research funds and community service, article writing workshops, provisions of article publishing assistance funds, and management of scientific journals.

Non-academic staff members also receive support for their development, which include excellence service training to increase the quality of service in e.g. the laboratories.

The teaching staff confirms to the experts that the university supports them in their professional development. This includes mandatory courses to enhance their teaching skills. Their training development includes basic skills for teaching as well as advanced teaching. Further personal development is possible also in sabbaticals. This requires the lecturer to be employed for at least three years before they are able to spend time outside the university. The teaching staff has already used these possibilities to spend time abroad in research collaborations including USA, Qatar, Malaysia, Singapore, Slovakia, Japan or India. Crucial is their financial support, which they receive from the Indonesian government or funding bodies such as the DAAD.

In summary, the experts learn that UNILA offers and supports the teaching staff, who wish to further develop their professional and teaching skills.

Criterion 4.3 Funds and equipment
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Evidence:

- Self-assessment report
- Discussions during the audit
- Visitation during the audit
- Inventories of laboratories

Preliminary assessment and analysis of the Experts:

At the Faculty of Mathematics and Natural Sciences (FMIPA) offers various laboratories to support the practical learning of the students. Within the bachelor program "Mathematics", the laboratories integrated in teaching are the laboratory of Applied Mathematics and

Applied Statistics. These rooms are equipped with new computers providing suitable software for each topic in the curriculum. Additional modern classroom technology supports the students' learning.

In the bachelor program "Physics" laboratories are mainly devoted to basic physics, basic electronics, and nuclear and experimental physics. While all students perform experiments in the basic physics laboratory, the laboratory on basic electronics is used for supporting research and practicum in electronics. The nuclear and experimental Physics Laboratory provides physics experiments in nuclear physics and optics.

In the documents, the experts note that certain laboratory equipment for the study program "Physics" is marked as broken and was not repaired nor replaced during the last years. The program coordinators confirm that they are aware of this fact and that they have requested repairs every semester to the university management. However, they have not yet received additional funding to do so. They ensure that the students can still perform their experiments with their remaining equipment. Students are usually working in groups of four to five students for their experiments, which the experts consider being a too large number for practical work. The students explain to the experts that they share the work within the group to equally involve everyone in the work; afterwards, the team meets to discuss the results. Within every group work, they do different tasks so that every student has the possibility to do different steps in their experiments. The experts acknowledge the effort of UNILA to accommodate the number of students to the limitations of the laboratories. Nevertheless, the experts consider smaller teams for group work would be more effective to give the students more practical experience during their studies. The partners from the industry, who state that the students have a strong theoretical foundation but still lack practical skills in the laboratory, support this opinion. The experts, therefore, recommend to the university to provide a sufficient number of equipment to allow the students to work in smaller teams in the laboratory classes. In general, the students are aware of the problems in the laboratories as they voice their desire to update the equipment in the laboratories. This further concerns also maintenance of the existing equipment as well as the purchase of new ones. After visiting the laboratories on campus, the experts strongly support the students' opinion to modernize the laboratories. In addition, they raise concerns on the safety in the laboratories in case of emergencies based on their own experience.

The program coordinators explain that they can propose new equipment to the university and the government. During the last year, they failed to receive any funding because the government requires that 30% of the instruments need to be manufactured by Indonesian companies, which was not included in their proposal. Funding for the faculty usually only

covers small expenses, which need to be justified. The teaching staff states that UNILA offers grants to its staff to improve their research capabilities and equipment. Larger equipment can also be proposed to UNILA, who transmits the request to the government if it is supported by the management.

The experts further raise the topic of library and library access to the students. The students from the program “Physics” explain that their library is small, however, they have easy access to all the basic books they require during their studies. They further confirm that they have online access to journals and books on and outside campus. Online access is the same for students in “Mathematics.” They add that ebooks are already linked in their list on reading materials in their syllabus, which gives them easy access to further reading. The lecturers provide additional reading material outside their availability on an individual basis. Therefore, the students are highly satisfied with their access to literature and reading materials.

In conclusion, the experts learn that UNILA offers a basis to teach the degree programs “Mathematics” and “Physics”. They receive sufficient funding to keep the programs operation supported by solid, binding rules for internal and external cooperations. However, the experts discovered significant room for improvement concerning the facilities and offered equipment in the laboratories during their visitation of the campus. The experts are aware of the challenges in receiving funding for the infrastructure; however, considering the risk in the laboratories, the experts advise UNILA to invest in improvements in the basic laboratory safety in the bachelor program “Physics” as soon as possible. This should include basics such as fire hazard and evacuations routes, which should be marked with clear signs. The fire extinguishers have to be mounted on the wall and not placed on a table. Based on their experience, the experts recommend having a fire extinguisher in each laboratory and someone from the technical staff maintaining it (regular inspection guaranteeing that it works). It is also highly recommended to have separate electrical fuses for each lab. Furthermore, it is necessary to keep the chemicals in a safe storage and provide a sign marking the danger of the chemicals in storage. In addition, all bottles and containers need to be clearly marked to inform everyone on the content and possible danger using these materials. General storage should further be secured to avoid falling out of the objects (no open shelf if possible). The experts advise that one person should be responsible for all aspects of safety in the laboratories and check them on a regular basis. In addition, the experts point out the risk in operating the laboratories without the installment of an emergency kill switch system. This should ensure that the experiments in the bachelor program could operate with the basic measures to ensure safety of the students and staff. Moreover, the experts request a strategic plan, which should document the maintenance and improve-

ment costs the university plans to spend on the campus facilities, including the laboratories, in the next five years. Concerning the laboratory maintenance in the bachelor program “Physics” the experts additionally recommend to employ a higher numbers of technicians who can advise students and take care of the facilities, equipment and check the laboratories or safety aspects. In the best case, this should involve at least one responsible person for each laboratory. Furthermore, the experts were wondering why the laboratory for “Material Physics” were not organized by its own management unit. Due to the difference in the laboratory needs for material physics in comparison with the other fields of physics, the experts would recommend to install a management team for the laboratory for “Material Physics.” Moreover, the experts highlight the risk of operating a laboratory for Nuclear Physics without a device, which can correctly measure radioactivity. Therefore, the experts consider it necessary to provide a device, which measures the radioactivity to guarantee the safety of all persons experimenting with radioactive sources in the laboratory. The experts further assert the students’ lack of student spaces on campus, especially around the Department of Mathematics. The experts highlight the importance of students’ learning spaces on campus, where they can e.g. meet to learn and work on group projects. The experts recommend expanding these students’ spaces on campus to allow them to have enough opportunities for social gatherings outside the classroom.

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

Ad criterion 4.3.

The majority of requirements and recommendations are only applicable for the study program “Physics.” During the on-site visit, the experts identified areas for improvements regarding the laboratories of the Department of Physics. UNILA has already provided a clear strategic plan documenting annual steps in improving the facilities. This is balanced with a reasonable financial plan. As a first step, UNILA has already approved funding from the Ministry of Education, Culture, Research and Technology. The experts consider these developments as very positive. They decide not to issue any requirements or recommendations in this regard.

UNILA has provided images and videos to document the improvements in the different laboratories. In particular, changes were made regarding the safety in the laboratory. These included properly installed fire extinguishers, warning signs and the installation of an emergency kill switch in all facilities. The experts are very content with the work UNILA has already done to guarantee the safety in the laboratories.

Nevertheless, the experts consider several issues remain unaddressed. First, this included the purchase of a device to measure radioactivity for the laboratory in Nuclear Physics (requirement A4).

The experts further requested to separate the laboratory for “Material Physics” and to establish a single laboratory. The experts approve the letter of intent to the rector as well as the submitted proposal. To further support this matter, the experts continue to issue the recommendation E13.

In addition, UNILA has presented documentation of a recently formed Health and Safety Environment team to manage the laboratories. The experts support this initiative to take care of safety issues in the laboratories. The statement by UNILA also included a request by the dean of the Faculty of Mathematics and Natural Resources to employ lab technician, who takes care of equipment and supports the students in their experiments. In the opinion of the experts, employing qualified personnel for lab maintenance is a key to ensure the usability of the laboratory in the future. Therefore, the recommendation E12 remains in place.

UNILA has further documented the availability of student learning spaces and places for group work. It is true that the experts might have had sufficient time to visit all the places during the on-site visit. However, this recommendation follows complaints by students. Since UNILA has not made any improvements in the availability of spaces for students on campus, the experts still issue the recommendation E10.

5. Transparency and documentation

Criterion 5.1 Module descriptions
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Evidence:

- Self-assessment report
- Module handbook of each study program
- Webpage „Mathematics“ <https://matematika.fmipa.unila.ac.id/>
- Webpage „Physics“ <https://fisika.fmipa.unila.ac.id/>
- Discussions during the audit

Preliminary assessment and analysis of the Experts:

UNILA issues module descriptions which are regularly updated. The responsible lecturer(s) of each module are responsible to prepare the documents before the beginning of every

semester. The head of each department is required to check all module descriptions for acceptance.

The module handbooks provided for all two programs contain information about the people responsible for each module, the teaching methods and workload, the credit points awarded, the intended learning outcomes, the examination requirements, the forms of assessment, the applicability, the admission requirements and details explaining how the final grade is calculated. Moreover, the module handbooks are uploaded on the website of the study program and are therefore accessible to all stakeholders.

The experts confirm that the module handbooks including description of each module are accessible online to all students, teaching staff and everyone interested. The module descriptions contain all the necessary information requested from ASIIN to give enough details on each module.

Criterion 5.2 Diploma and Diploma Supplement

Evidence:

- Self-Assessment Report
- Samples Diploma
- Samples Diploma Supplement

Preliminary assessment and analysis of the Experts:

The experts confirm that students of all two bachelor study programs receive a Diploma and a Diploma Supplement after graduation. The Diploma consists of a Diploma Certificate and a Transcript of Records. The Transcript of Records lists all the courses that the graduate has completed, the achieved credits, grades, and cumulative GPA. It includes all academic and additional non-academic achievements.

However, the experts point out that the Transcript of Records should also mention the awarded ECTS point points for each course, which is required according to the ASIIN criteria. In addition, the experts noticed that the diploma supplement does not inform people from outside on the specialization the students have decided on (Mathematics: 1. Analysis and Applied mathematics 2. Algebra, Operations Research and Combinatorics 3. Statistics and Physics: 1. Physics of Instrumentation 2. Physics of Material 3. Physics of Energy)

Criterion 5.3 Relevant rules

Evidence:

- Self-Assessment Report
- Statute of University of Lampung
- All relevant regulations as published on the university's webpage

Preliminary assessment and analysis of the Experts:

The main rules to regulate operational procedures of UNILA are published in the statute of the University of Lampung, which was submitted as appendix to the SAR. This includes all rights, obligations of students, lecturers and the university. The management at the University of Lampung such as the Rector and vices rector, dean and vices deans, head of departments, and head of study programs are all responsible for managing and maintaining the rights and obligations of students. Students receive this statute together with an introduction to their obligations during the orientation week.

The auditors confirm that the rights and duties of both UNILA and the students are clearly defined and binding. All rules and regulations are published on the university's website and the students receive the course material at the beginning of each semester.

In addition, most of the relevant information about the study program (e.g. study plan and profile) is available on the English homepage of each program. However, the rules and regulations are either not available or only in Indonesian. The experts therefore ask UNILA to make them available in English as well.

The experts state that UNILA has defined rights and duties of both, the higher education institution and students, which are clearly defined and binding (guidelines, statutes etc.). All relevant course-related information is available in the language of the degree program and accessible for anyone involved. However, the experts remark that a higher degree of information in English on the university webpage is advised. This should allow the university to reach a greater number of international students and staff and therefore support the strategy of internationalization of UNILA.

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

Ad criterion 5.2.

In their statement, UNILA did not provide any new information regarding conversion of Indonesian credit points to ECTS credit points in the Transcript of Records. The experts therefore maintain the requirement A3.

Ad criterion 5.3.

UNILA did not comment on improvements regarding the presented information on the university webpage. The experts consider it important to present an overall overview of the study programs in English to everyone interested in these programs. In addition, important documents such as module handbooks and the student handbook should be fully available for download.

6. Quality management: quality assessment and development

Criterion 6 Quality management: quality assessment and development

Evidence:

- Self-Assessment Report
- UNILA Academic Guidelines
- Discussions during the audit

Preliminary assessment and analysis of the Experts:

According to the SAR, UNILA has established an institutional system of quality management aiming at continuously improving the degree programme. This system relies on internal and external quality assurance. The results of the quality management processes are integrated into the strategic plan of the University of Lampung and its vision, mission and goals.

The internal quality assurance system encompasses all activities focused on implementing measures for improving the teaching and learning quality at UNILA. This includes also training, consultation, mentoring and cooperation in the field of academic quality assurance. This includes providing all necessary tools to implement such a system to periodically evaluate and develop both, the university structures and the study programs. The internal quality assurance system conducts internal quality audits among the faculty, study programs, laboratories, bureau, institutions and all work units. The results of surveys and monitoring are communicated to the chancellor, dean and the evaluated participants. The results lead to the development of follow-up steps and procedures.

The internal quality assurance operates at university, faculty, study program and working unit level (e.g. laboratories). At the university level, the Office of Center of Learning Development and Quality Assurance coordinates the implementation of internal quality assurance. They operate:

- 1) Center for Quality Assurance (Pusat Penjaminan Mutu) related to the implementation of internal quality audits,
- 2) Center for Curriculum Development and Management of Independent Learning Independent Campus (MBKM), related to curriculum monitoring and evaluation activities, including internships, and student exchanges,
- 3) Center for Learning and Teaching Development (Pusat Pengembangan Aktivitas Instruksional dan Inovasi Pembelajaran), related to monitoring and evaluating the use of learning strategies, and
- 4) Center for e-Learning Development (Pusat Pengembangan Pembelajaran Daring dan Pendidikan Jarak Jauh), related to monitoring and evaluating the use of e-learning and online learning media in improving student learning outcomes.

On the faculty level, the implementation of internal quality assurance is coordinated by the Faculty Quality Assurance Team, whereas at programme level it is carried out by the Study Program Quality Assurance Team.

Internal evaluation of the degree program's quality is mainly provided through students, alumni, and employer surveys. The students give their feedback on the courses by filling out the questionnaire online at the end of each semester. Students assess various aspects such as students' understanding, lecturer's responsiveness, course delivery, lecturer's proficiency, explanation of course objective, and references in each enrolled course. In addition, students can voice their opinions in different boards and are therefore able to discuss urgent matters on different levels.

Giving feedback on the classes is compulsory for the students; otherwise, they cannot access their grades on the digital platform SIAKADU. UNILA provides a summary of the survey results online to all students. In case the satisfaction of the students with staff members is deficient, the head of the study program will contact the respective teacher, discuss the issue and propose solutions. If no improvement can be achieved over a longer period, the staff member will be dismissed. In addition, UNILA regularly conducts alumni tracer studies. By taking part at this survey, alumni can comment on their educational experiences at UNILA, the waiting period for employment after graduation, their professional career and can give suggestions how to improve the programme.

Furthermore, there is the Career Development Centre at UNILA, which offers help to find suitable internships, announces job vacancies, and offers courses to develop soft skills. The Faculty of Agriculture organizes a job fair every year, in addition, the contacts students make during the internship and the final project, which can be conducted outside UNILA, sometimes lead to job offers.

To ensure the quality of the university, UNILA conducts an internal quality audit, which considers (1) achievement of the vision and mission of the study program, (2) implementation of cooperation and governance that leads to good university governance, (3) development of interest in the study program among new students, (4) human resource profile, (5) availability of finance, facilities, and infrastructure, (6) educational performance implementation, (7) research performance implementation, (8) community service performance implementation, (9) lecturer and student outcomes, (10) the implementation of MBKM activities in the study program, and (11) other criteria related to the achievement of the Main Performance Indicators and the supporting performance of the achievement of University of Lampung's Green Metrics.

The external quality assurance system of UNILA focuses on both national and international accreditations. Every study program is accredited by the National Accreditation Board of Higher Education (BAN-PT).

In the discussion with the experts, the representatives of the rector's office describe their quality management starting from the quality assurance at the university level, the faculty level and the level of each study program. Most of their evaluations is based on their EDOM system, which allows them to quickly distribute questionnaires to the target audience. The integrated quality management system allows the university to combine the information from different levels. It further allows UNILA to integrate and track the key performance indicators by the Indonesian government as well as their unique UNILA standards. They also use EDOM to monitor the academic process of students and to provide academic guidance. The head of the department and the management of the university can enter this system to monitor the number of ongoing lectures and offered exams. Students also use EDOM to track their student achievements. Internal evaluation of the study programs takes place between July and August each year. The representatives from the rector's office explain that they analyze the data from the bottom (study programs) to the top (university quality assurance) to develop strategies to improve the programs and decide the university strategic plan for the next years.

The representatives of the rector's office confirm that student surveys are performed at the end of each semester and that this survey is anonymous. Students cannot access their data without filling out the evaluation form. One member of the quality assurance team on study program level is responsible to compile the survey and analyze prior to the survey, which topics should be address and which areas might need improvement. At UNILA, the students are entitled to receive the results from these surveys due to a contract; at the beginning of each semester, the lecturer and the students sign a contract, which gives the students the possibilities to request improvements in teaching. When students are complaining, the lecturers have to give an explanation including e.g. the speed of teaching or

the re-explanation of a subject. This contract demands the lecturer to inform the students of the results of the evaluation. The experts also discuss the evaluations with the students; they confirm that they fill out questionnaires at the end of the semester. These include around 20 questions, which include among others questions on the quality of the study program, the lecturer as well as the integrated equipment. The students tell the experts that they are not involved in the discussions following the results but that they receive a feedback in the next semester.

In conclusion, the experts consider that the programs under review are subject to regular internal quality assessment procedures aiming at continuous improvement. All responsibilities and mechanisms defined for the purposes of continued development are binding. The experts assure that students and other stakeholders take part in the quality assurance processes. All involved parties receive sufficient information on the outcomes and measures on the basis of the methods employed. The methods applied and data analyzed are suitable for the purpose and used to continue improving the degree program, especially with a view to identifying and resolving weaknesses. Still, the experts want to draw the attention to the problems identified in regard to the tracer studies during this review. The experts remark that the tracer studies need to adequately be able to resolve the status and type of employment of the graduates. The experts therefore recommend reassessing their current questions and options for answers of these questions. In particular, the questions need to present options, which allow the students to assign their occupation in freelance and entrepreneurial activities as well as whether the graduates are actively searching for new career options or not. This should provide a better basis to analyze the employability of the graduates in the two programs under review.

D Additional Documents

„No additional documents needed“

E Comment of the Higher Education Institution (31.10.2023)

The institution provided an extensive statement; additional figures and tables were not included in the statement in this accreditation report:

“RESPONSE TO ASIIN REPORT

On behalf of the Faculty of Mathematics and Natural Sciences (FMIPA), we are grateful to the ASIIN, especially, to the experts of ASIIN for their inspiring and insightful comments. As mentioned in the introduction of the self-assessment report (SAR), The Faculty recognizes that one of the critical strategies in the enhancement of the quality standards and the goals of the Faculty is through international accreditation. The Faculty of Mathematics and Natural Sciences then considers the Undergraduate Programme in Mathematics and Undergraduate Programme in Physics to follow a program of international accreditation of ASIIN which in terms of academic areas, the ASIIN is highly relevant to these Study Programs and is well recognized by the Minister of Education, Culture, Research and Technology of Indonesia, Indonesian Government. Therefore, Comments of ASIIN experts help clarify and sharpen the issues that are extremely important not only for the Study Program development but also for the Faculty in achieving its academic goals in developing regional and international competitiveness issues.

In response to the ASIIN expert's comments, we, seriously, take into account to follow up the recommendations. For example, in terms of the diploma of the Undergraduate Programme in Mathematics, “Bachelor of Mathematics”. In order to make the Undergraduate Programme in Mathematics of UNILA internationally recognized, through the Faculty, the Study Program sent a request letter to the university to return the name of the awarded degree as the first it is established “Bachelor of Science”. In terms of laboratory management, as recommended by the experts, the Undergraduate Programme in Physics, through the Faculty, has proposed the establishment of the Material Physics Laboratory. The Material Physics laboratory will give service final project students' experiments and lecturers' research on Material Physics research group.

Moreover, the Faculty recognizes that learning is an active process and knowledge is created based on the social negotiation between the learners and their environment. Therefore, the Faculty is committed to ensuring students have access to the best learning spaces, both physical and virtual. Our institution gradually reviews and invests in our learning spaces and all our other infrastructure for students. Based on comments from ASIIN experts, FMIPA has designed a vacant space located between the mathematics and biology buildings for the student learning space that can be used collectively.

The Faculty understands that the ASIIN accreditation is not simply a one-off award. Again, once the Undergraduate Programme in Mathematics and the Undergraduate Programme in Physics are accredited, hopefully, the Faculty can still keep working with ASIIN in improving and maintaining academic excellence for the needs of academic international standards, and for the international community development in general.

Response criterion 1.1

Response (from Math) (page 12):

“When the Undergraduate Programme in Mathematics was established in 1998, the graduates received a “Bachelor of Science”. In 2018 the Minister of Research, Technology and Higher Education issued Regulation 59/2018, article 20 paragraph d which is: “The procedures for writing a bachelor's degree, written behind the name of the program graduate undergraduate by including the letter “S.” and followed with the initials of a tree in the clump of science and technology or the initials of the name of the study program.” Unila still awarded name “Bachelor of Science” until in year 2022, the Directorate of Higher Education issued a decree No. 163/E/KPT/2022 about the name of the degree awarded to the graduates. According to that decree, mathematics is included in formal science and the name for the awardee degree is “Bachelor of Mathematics” or Sarjana Matematika (S.Mat). According to that decree, mathematics is included in formal science and the name for the awardee degree is ‘Bachelor of Mathematics” or Sarjana Matematika (S.Mat). Therefore, we obey the rule and change the graduates to be the “Bachelor of Mathematics”. Based on ASIIN’s expert recommendation, in order to make this Undergraduate Programme in Mathematics is internationally recognized, the study program sent a request letter to the university to return the name of the awarded degree as the first it was established. The following link is the letter from the study program to the faculty and from the faculty to the university [here](#).”

Response (page 13):

“The entrepreneurship course is designed to teach students various aspects related to starting, developing, and managing a business or enterprise. It includes:

Business Plan: Encompassing business description, market analysis, marketing strategy, financial analysis, and operational plan, Creativity and Innovation: Developing creative skills and innovative thinking within a business context; Business Management: Covering basic management principles, such as human resources management, operations, finance, and marketing; Business Finance: Cash flow management, financial planning, cost analysis, and financial decision-making; Marketing: Principles of marketing, market research, promotion, product development, and marketing strategies; Small and Medium Enterprises: Strategies for developing small and medium-sized businesses; Business Ethics: Ethics in the business world and how to make ethical business decisions; Business Development: Practical aspects of starting and developing a business, including financing, licensing, business law, and risk management; Sustainable Business Plan: Integrating sustainability principles into a business plan; Case Studies and Business Analysis: Studying successful and failed companies, and analyzing the strategies and factors influencing their business performance. Both study programs have made some efforts to increase the learning quality, and it is also related to one

of the physics alumni profiles, namely Creative and innovative entrepreneurs in physics/science education (edu-preneurs). Efforts to enhance the learning quality are continuously undertaken by conducting evaluations and learning innovations as follows:

“Undergraduate Programme in Mathematics

The Entrepreneurship course is given in the fourth semester in the 2020 Curriculum, while the General Management course is given in the fifth semester. In the 2020 Curriculum revision which is scheduled for next year (2024), both courses will be switched so that General Management will be given in the fourth semester and Entrepreneurship will be given in the fifth semester. This semester two students from the undergraduate study program in Mathematics won the first and second prize of the entrepreneurship competition held by FMIPA Unila on 28th October 2023.

Undergraduate Programme in Physics

The 2020 Curriculum places the Entrepreneurship Course in the third semester. It is planned that it is necessary to move it to the sixth semester in 2024 Curriculum based on the Curriculum Review which was held on 23rd October 2023, because it is considering that students should have acquired product development skills taught in the workshop instrumentation or physics energy workshop courses, and the students have already chosen their minor (specialization) in the fifth semester.

- Integrating tasks from several courses with the Entrepreneurship Course. The integration of several courses into one project (design, workshop, and entrepreneurship) allows students to complete their studies more quickly.”

Response (page 13):

“Unila realizes that the number of alumni who are unemployed is still quite high. One of the reasons is the lack of varied responses that accurately depict the real conditions, which are not present in the questionnaire. Based on the feedback received during the ASIIN closing ceremony on 6th July 2023, the Center for Career and Entrepreneurship Development (CCED) institution has made improvements to its questionnaire, especially in the response “unemployed”, which is now presented in Table 1, where Figure 2 shows the CCED website regarding that matter.”

Response criterion 1.3

Response (pages 16–17):

“When the Undergraduate Programme in Mathematics was established, the lecturers in the program study realized that lecturers should be grouped into peer groups, and the most common peer groups in mathematics are pure mathematics, applied mathematics, and statistics. The lecturers were divided into those three peer groups. However, as time went by, some lecturers passed away and they were from the pure mathematics peer group, so that peer group only consisted of three lecturers left. Realizing the unbalance in the number of the peer-group members where pure mathematics only consists of one analysis lecturer and two algebra lecturers, the study program re-arranges the peer group so that the peer group members are more balanced.

We appreciate the suggestion given by ASIIN’s expert. We will re-organize and re-arrange the lecturer into three peer groups: pure Mathematics (Analysis and Algebra), Applied Mathematics, and

Statistics. The formal letter to re-organize the lecturers into peer groups is in the following link [here](#).”

Response (page 18):

“The connection of the Undergraduate Programme in Mathematics and Computer Science has a long history. As we stated in Section 2.1, since the beginning of establishment of the Undergraduate Programme in Mathematics in 1998, we have considered that the Undergraduate Programme in Mathematics is a unique combination of theoretical and applied levels to identify and solve real-world problems, such as in education, industry, environment, agriculture, health, social and economy. In order to find solutions of the real problems, the program is also oriented to the utilization of computer technology. Thus, the students are equipped with knowledge of computer programming. The students should be able to program in a little bit higher-level language and to think algorithmically.

The Undergraduate Programme in Computer Science was established in 2005, before that time the pioneers of the computer science study program were in Undergraduate Programme in Mathematics, and the founding fathers of the Undergraduate Programme in Computer Science were lecturers in Undergraduate Programme in Mathematics. Thus, both Undergraduate Programme in Mathematics and Computer Science, psychologically had a strong connection. Moreover, the connection continues in the academic atmosphere where some computer science lectures are included in the supervision of the student’s thesis. In addition, the study program not only has a connection with computer science but also with other institutions/companies, for example with the Board of National Research and Innovation (BRIN) where students do research, and the person in charge in that institute also acts as co-supervisor for student’s thesis. The following link shows the evidence: [here](#).

Please note that the examples given on that link are the articles which have been published (in collaboration with BRIN), and the theses (the collaboration with the Undergraduate Programme in Computer Science and also with BRIN). “

Response (page 19):

“Both study programs realize and recognize the importance of using commonly used, open-source, and widely accepted software in the scientific community such as LaTeX. To introduce that software to students, both study programs have made a workshop as follows:

Undergraduate Programme in Mathematics

The workshop on using LaTeX for students was done in the Undergraduate Programme in Mathematics on 23rd September 2023 offline at computer laboratory. There are 96 students joining this activity. Figure 3 shows the activity.

Undergraduate Programme in Mathematics

The workshop on using LaTeX for students was done in the Undergraduate Programme in Mathematics on 23rd September 2023 offline at computer laboratory. There are 96 students joining this

activity. [...] The speaker of the workshop was Prof. Drs. Pekik Nuwantoro, M.Sc. Ph.D from Gadjah Mada University.

The video of that workshop can be found [here](#). Learning material of LaTeX from the keynote speaker can be accessed [here](#).”

Response (page 21):

“The effort to improve English language proficiency is a significant concern for both study programs. Several activities have been carried out for this purpose, such Mathematics English Club, and Physics English Club. On Friday, there is an English day, where FMIPA academic community (including students) is encouraged to speak English. When they write their thesis, most of the supervisors are asked for international journals or English textbooks as references. Moreover, most of the lectures also use English in the class presentations, especially for elective courses, and use bilingual (Bahasa Indonesia and English) in teaching (especially for elective courses). Currently, some systematic efforts are made to enhance students’ English language proficiency. Some of the recent initiatives include:

Undergraduate Programme in Mathematics

- Presenting the project seminar using English presentation and English or bilingual)
- Start writing a bachelor thesis in English for students who have good English. [...]

Undergraduate Programme in Physics

- Conducting workshops and English language training in collaboration with The Unila Language Center, as part of the Physics English Club activities (Figure 7). The opening ceremony and the class lectures can be viewed [here](#)
- Starting from 2020 Cohort, the project thesis is written in English
- The project presentation and some tasks are written in English. The evidences are presented [here](#).

It is an effort to improve the ability of students to speak English. We also have special time for coaching their English to prepare English speech competition in faculty and university level (Figure 8). The video of preparing English speech competition for celebrating our faculty anniversary can be accessed” [here](#).

“Finally, students of Undergraduate Programme in Physics achieved the first, second, third and fourth winner in our faculty English speech competition (26th October 2023) which is shown in Table 2.

This result of our champion in English competition gives a great motivation for all physics students to improve their English ability for their communication in campus.”

Response criterion 1.4

Response (page 24):

“The meeting of the Physical Society of Indonesia (PSI) and MIPA-Net in Denpasar, Bali, on 20th – 22th August 2023, discussed the decline in the interest of prospective students in the Undergraduate Programme in Physics and how to address it. A representative from the Undergraduate Programme in Physics attended the meeting. During the meeting, recommendations were made regarding

strategies to increase the interest of prospective students such as promoting the uniqueness of physics study program in every university and adapting the curriculum to technological advances without neglecting the minimum curriculum required by society. Figure 9 shows the opening ceremony of the meeting.“

Response criterion 2.1

Response (page 28):

“Undergraduate Programme in Mathematics

In the Undergraduate Programme in Mathematics, the students can choose the place where they want to do the internship as follows:

- Students can look at the previous placements of their seniors by looking at the data available at the study program administrator. That place of internship also includes the company/institution whose agreement with the university or faculty.
The following link shows the list of placements, and can be seen [here](#).
- The students can choose their own company under the recommendation of their internship supervisor.

After the student applies for the internship which is usually scheduled during the semester break, the head of the study program and program coordinator for the internship program arrange a meeting for the students who applied for that period. The meeting will discuss what the students should do and not do during the internship program, and how to compile an intern report. During the internship, the supervisor will come to the place where the students do the internship to do the monitoring (Figure 10).“

Undergraduate Programme in Physics

In the internship program, the selection of a company for the Undergraduate Programme in Physics is done using two methods:

- Students can choose an internship placement at a company that already has a collaboration agreement (MoA) with the faculty.
- Students can independently search for an internship placement by conducting their own research and searching for suitable opportunities.

On the fifth semester, the students should choose their own specialization. Then, the peer group coordinator will arrange a meeting for a briefing regarding the location/placement and job opportunities as presented in Figure 11 and [here](#)”

Response (page 29):

“For the time being, the faculty will continue short-term student mobility with other universities (e.g., University Malaya). Subsequently, the faculty will incorporate this student exchange program in the following academic year by expanding the collaboration network with other universities.”

Response criterion 2.2

Response (page 31):

“The faculty appreciates the ASIIN expert’s advice and follows it up by sending a letter to the university to include a new feature to calculate the total workload in the SIAKADU (Unila Academic System) as can be seen [here](#).”

Response (page 32):

“Undergraduate Programme in Mathematics

In the Undergraduate Programme in Mathematics, the seminar and thesis are already split in the 2020 Curriculum. This can be seen on the website of the undergraduate study program in Mathematics in the 7th semester at [here](#)

In the 2020 Curriculum, Project Seminar I and Project Seminar II have the same credit i.e. 1 SCU (1.6 ECTS). The expert recommended 2 SCU. The Undergraduate Programme in Mathematics will revise the 2020 Curriculum next year (2024) as it is already scheduled. The study program cannot change it because currently there are more than one-third of the students in the 2020 Cohort have already taken Project Seminar I and Project Seminar II, and that is already reported in the system related/connected to the Indonesian National Higher Education Database (PDDIKTI). All accredited study programs in Indonesia must report to PDDIKTI at least once every semester. The changes can be made if the curriculum has been revised and changed.

Undergraduate Programme in Physics

The Undergraduate Programme in Physics has already revised the credits unit to be 8 SCU, with the details as follows: Project Proposal Seminar I (2 SCU), Project Proposal Seminar II (Result) (2 SCU), and Thesis Project (4 SCU).

Please note that the Undergraduate Programme in Physics can make revision and put in the system (as is shown in Figure 12), because there have not been yet 2020 Cohort students take thesis project at the moment. Thus, there are none students of 2020 Cohort reported taking project proposal or project thesis. Therefore, the changes can be applied for all 2020 Cohort in Undergraduate Programme in Physics.”

Response (page 34):

“We have implemented flipped classrooms in several courses, mostly elective courses. At the beginning of the semester, lecturers provided materials in the form of textbooks, slide presentations, journals, learning videos, and others in Unila e-learning, Vclass (<https://vclass.unila.ac.id>). At the beginning of the meeting, students are asked to study the material first. This makes students more active because their curiosity is increased. During the meeting, students are asked to present what they have learned. Thus, students are trained to communicate what they have learned to their peers. To deepen the material learned, the lecturer can also invite students to discuss in small groups. The lecturer acts as a facilitator and goes around the class to motivate and monitor the students' activeness in the discussion. Based on the experience of lecturers who have practiced flipped classrooms, the results are encouraging, and the quality is better. With this method, their motivation to learn increases, their responsibility increases, and students are more active in class.”

Response criterion 4.3

Response (page 44):

“Undergraduate Programme in Mathematics

There is no problems with student limitations in mathematics because every computer is occupied by one student in the computer laboratory.

Undergraduate Programme in Physics

The Undergraduate Programme in Physics appreciate the suggestions and input from ASIIN expert during the closing ceremony. In order to form the practicum group which consists of maximum three students, the schedule in this Odd Semester of Academic Year 2023/2024 was made by considering the amount of equipment. For example, if the amount of students is 21 students which is equal to 7 groups and the amount of equipment or titles is only 4 equipment or titles, then the practicum will be done in two days in a week. It means every day serves 4 titles of practicum. The practicum schedule in Odd Semester of Academic Year 2023/2024 can be seen [here](#). Figure 13 shows the example of group practicum, and the practicum activities in recent semester can be seen [here](#)”

Response (page 44):

“Main Building

Video: [here](#)

Maintaining plan included:

1. Exterior painting and frame replacement wood to aluminium (in 2024)
2. Granite floor replacement 2nd floor (in 2024)
3. Physics department exterior (in 2025)
4. Exterior painting and frame replacement wood to aluminium painting (in 2025)
5. Granite floor replacement of 1st floor basic physics (in 2025)
6. Replacement with granite of 2nd floor of physics building (in 2026)
7. Replacement with granite of 1st floor of physics building (in 2028)
8. Improvement of meeting room physics building (2028)

Laboratory

Video: [here](#)

1. Exterior maintenance of physics laboratory (in 2026)
2. Maintenance and improvement physics laboratory (in 2027)

The plan document in five years is as given [here](#)

Photos of development plan in five years are given [here](#)

Development of Laboratory Equipment

1. Financing by the Program of Higher Education Revitalization (PRPTN) 2024.

Program of Higher Education Revitalization (PRPTN) 2024 is designed to accelerate the quality improvement of university so that the university can be transformed from un-autonomous university (PTN-Satker) to be semi-autonomous university (PTN-BLU) and semi-autonomous university (PTN-BLU) to be autonomous university (PTN-BH).

The document of Program of Higher Education Revitalization (PRPTN) 2024 which is already approved by the Ministry of Education, Culture, Research and Technology: [here](#)

2. Financing by the university

This document shows the commitment of the university for developing the laboratory equipment in Physics Department as follow: [here](#)”

Response (page 45):

“According to the ASIIN Expert’s comment, we have arranged the equipment (Figure 14 and Figure 16), and separated dangerous liquid chemicals in the materials laboratory (Figure 15).

The laboratories in the Undergraduate Programme in Physics are equipped with evacuation routes and Fire Extinguisher which aims to ensure safety and protection against fire. Evacuation routes are clearly defined routes that allow people in the laboratory to immediately leave the room when an emergency occurs, such as a fire. These evacuation routes are usually equipped with evacuation signs to ensure that people can quickly and safely leave the area (Figures 17 – 21).”

Response (page 45):

“The Physics department has successfully installed an emergency switch system in every laboratory room. This installation includes easily visible switch buttons. The switch system is designed to shut down the entire electrical installation network within the laboratory, including the power supply to the equipment (jacks) and lights. This enables a quick response to prevent electrical hazards without disrupting the electrical network in other rooms. The system is neatly connected to a magnetic contactor installed near the main panel box (Figure 22).

Testing video after installation can access [here](#), video immediately after the installation [here](#) and [here](#).”

Response (page 46):

“To increase quality of laboratory service for teaching and research in Material Physics, Undergraduate Programme in Physics has proposed the establishment of Material Physics Laboratory which is separated from the Laboratory of Experiment and Nuclear Physics. Material Physics laboratory will give service final project students experiments and lecturers research on Material Physics research group. The proposal documents of Material Physics Laboratory establishment is given [here](#) and [here](#).”

Response (page 46):

Undergraduate Programme in Physics has proposed to purchase radiation detector equipment that will be used for measure radiation and for students course experiment. The letter from the Dean to university is given [here](#).

Response (page 46):

In order to improve the Health and Safety Environment (HSE) for students. Faculty of Mathematics and Natural Sciences - University of Lampung has formed the HSE Team which is responsible to the HSE in laboratories. The Dean Decree of the HSE Team as given [here](#).

Undergraduate Programme in Physics has applied to recruit laboratory staffs for responsible safety and helping student experiments in every laboratory. The letter from Dean to university as given [here](#).

Response (page 46):

The Undergraduate Programme in Mathematics appreciates the comments/advice given by ASIIN's expert. Learning is an active process and knowledge is created based on the social negotiation between the learners and their environment. Therefore, learning space, as the one main factor that can impact how effectively the student can learn, needs to provide an environment that will challenge the learner and their thinking. The University of Lampung, especially the FMIPA, is committed to ensuring students have access to the best learning spaces, both physical and virtual, in the last five years and into the future. Our institution gradually reviewing and investing in our learning spaces and all our other infrastructure for students. Moreover, the University, also, considering to apply resource sharing policies in learning spaces. Thus, to some extent, MIPA students may utilize learning spaces in the other faculties and the University facilities. For students in the undergraduate study program in Mathematics, there are several places/locations where they can engage in discussions. Some empty spaces between buildings are utilized as places for students to discuss. Additionally, in the undergraduate study program in Mathematics, there is a quite spacious room on the 2nd floor of the Mathematics building, adjacent to the laboratory, serving as a common discussion space. This room is equipped with a whiteboard for students to express thoughts and write. The following images provide an overview of the discussion spaces available for students in the undergraduate study program in Mathematics. Furthermore, based on comments from ASIIN experts, FMIPA has designed a vacant space located between the mathematics and biology buildings for the student learning space that can be used collectively (Figures 23 and 24).

Response criterion 5.1

Response (page 47):

"The faculty appreciates the ASIIN expert's comment, and follows it up by sending letter to the university to include ECTS into transcript in the SIAKADU ad can be seen [here](#)."

The following link shows the letter from the vice rector for students and alumni regarding the Student Specialization Proposal [here](#)."

Response (page 47):

"The link to the statute of Universitas Lampung can be found [here](#). The following link indicates the Universitas Lampung Academic Regulation [here](#) and [here](#)."

Response criterion 6

Response (page 52):

“This report is similar to the report 1.1 The Degree Program: Concept, content & implementation on page 13. The CCED of Universitas Lampung has already made some improvements to its questionnaire, especially in the response “unemployed” as already explained before.”

F Summary: Expert recommendations (13.11.2023)

Taking into account the additional information and the comments given by 5 the experts summarize their analysis and **final assessment** for the award of the seals as follows:

Degree Program	ASIIN Seal	Maximum duration of accreditation	Subject-specific label	Maximum duration of accreditation
Ba Mathematics	With requirements for one year	30.09.2029	–	-
Ba Physics	With requirements for one year	30.09.2029	–	-

Requirements

For all degree programs

- A 1. (ASIIN 2.2) Develop a mechanism to assess the total workload of each module and the total workload of students per semesters. The workload of each module have to match the awarded credits.
- A 2. (ASIIN 3) Formalize the exam regulations in case of illness.
- A 3. (ASIIN 2.2 & 5.2) A conversion from Indonesian to ECTS credit points should be added to the Transcript of Records.

For the bachelor's degree program "Physics"

- A 4. (ASIIN 4.3) It is necessary to provide a device, which measures the radioactivity to guarantee the safety of all persons in the laboratory.

Recommendations

For all degree programs

- E 1. (ASIIN 1.3) It is recommended to increase the use of English in the classroom (reading materials, presentations, reports, slides, discussions, laboratory instructions, etc.).

- E 2. (ASIIN 1.3) The experts encourage UNILA the increased usage and training courses of international software standards, especially LaTeX, but also other open source products like UNIX, R, Python, Gimp and others.
- E 3. (ASIIN 2.1) It is recommended to improve the distribution of information for internships.
- E 4. (ASIIN 2.1) It is recommended to increase the student mobility by providing better facilities and structural support from the faculty/university.
- E 5. (ASIIN 2.1) It is recommended to improve the collaborations with the Industry (non-governmental) to give the students more diverse insight during their internships.
- E 6. (ASIIN 2.3) It is recommended to increase the use of “inverted classroom” as a teaching method (including in English language).
- E 7. (ASIIN 5.3) It is recommended to improve the distribution of information on the study program and its regulations in English on the webpage.

For the bachelor’s degree program “Mathematics”

- E 8. (ASIIN 1.1) It is recommended to restructure the specializations (“groups”) into “Pure Mathematic”, “Applied Mathematic” and “Statistics” to increase the understanding of stakeholders of the graduates’ qualifications.
- E 9. (ASIIN 1.3) It is recommended to quickly implement changes in the field of data science into the curriculum to meet the demands on the job market.
- E 10. (ASIIN 4.3) It is recommended to improve the student spaces on campus to support their group work, social gatherings, etc.

For the bachelor’s degree program “Physics”

- E 11. (ASIIN 2.3) It is recommended to reduce the number of students for group work in the laboratories.
- E 12. (ASIIN 4.3) It is recommended to increase the number of technicians in the different laboratories.
- E 13. (ASIIN 4.3) It is recommended to establish a management team to take care of the laboratory for “Material Physics.”

G Comment of the Technical Committees (29.11.2023)

Technical Committee 12 – Mathematics (29.11.2023)

Assessment and analysis for the award of the ASIIN seal:

Mrs. Kern reports on this accreditation process. The Technical Committee discusses in particular the recommendation E6. The Technical Committee considers that the recommendation is very specific. It approves that the need to enhance the students' English abilities is already part of recommendation E1, which is sufficient according to the Technical Committee. Therefore, it decides to delete the recommendation E6. The discussion continues with a focus on E9. On one hand, the Technical Committee discusses the extent of which a curriculum should be job-market oriented; on the other hand, the Technical Committee wonders if it is necessary to give this recommendation since the university has already adapted the curriculum in this field. Other members point out, that the area is data science is important since a majority of the graduates of this study program works as data analysts and similar occupations. The Technical Committee finds a compromise between the two different opinions in rephrasing the recommendation E9. In addition, the Technical Committee discusses the arguments for issuing the recommendation E8 as well as the requirement A1; the Technical Committee decides not to make any changes. The Technical Committee is further interested in the background of deleting the recommendation on tracer studies based on the statement of the university and its relation to the high employment mentioned in the report. Based on the explanation given by Mrs. Kern, the Technical Committee approves this change.

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

Degree Program	ASIIN Seal	Maximum duration of accreditation	Subject-specific label	Maximum duration of accreditation
Ba Mathematics	With requirements for one year	30.09.2029	–	-

Requirements

For all degree programs

- A 1. (ASIIN 2.2) Develop a mechanism to assess the total workload of each module and the total workload of students per semester. The workload of each module has to match the awarded credits.
- A 2. (ASIIN 3) Formalize the exam regulations in case of illness.
- A 3. (ASIIN 2.2 & 5.2) A conversion from Indonesian to the ECTS credit points should be added to the Transcript of Records.

Recommendations

For all degree programs

- E 1. (ASIIN 1.3) It is recommended to increase the use of English in the classroom (reading materials, presentations, reports, slides, discussions, laboratory instructions, etc.).
- E 2. (ASIIN 1.3) The experts encourage UNILA the increased usage and training courses of international software standards, especially LaTeX, but also other open source products like UNIX, R, Python, Gimp and others.
- E 3. (ASIIN 2.1) It is recommended to improve the distribution of information on internships.
- E 4. (ASIIN 2.1) It is recommended to increase the student mobility by providing better facilities and structural support from the faculty/university.
- E 5. (ASIIN 2.1) It is recommended to improve the collaborations with the industry (non-governmental) to give the students diverse insight during their internships.
- E 6. (ASIIN 5.3) It is recommended to improve the distribution of information on the study programs and its regulations in English on the webpage.

For the bachelor's degree program "Mathematics"

- E 7. (ASIIN 1.1) It is recommended to restructure the specializations ("groups") into "Pure Mathematics", "Applied Mathematics" and "Statistics" to increase the understanding of stakeholders of the graduates' qualifications.
- E 8. (ASIIN 1.3) It is recommended to implement changes in the field of data science into the curriculum.
- E 9. (ASIIN 4.3) It is recommended to improve the student spaces on campus to support their group work, social gatherings, etc.

Technical Committee 13 – Physics (28.11.2023)

Assessment and analysis for the award of the ASIIN seal:

The Technical Committee discusses the procedure and follows the assessment of the auditors without any changes.

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

Degree Program	ASIIN Seal	Maximum duration of accreditation	Subject-specific label	Maximum duration of accreditation
Ba Physics	With requirements for one year	30.09.2029	—	-

Requirements

For all degree programs

- A 1. (ASIIN 2.2) Develop a mechanism to assess the total workload of each module and the total workload of students per semesters. The workload of each module have to match the awarded credits.
- A 2. (ASIIN 3) Formalize the exam regulations in case of illness.
- A 3. (ASIIN 2.2 & 5.2) A conversion from Indonesian to the ECTS credit points should be added to the Transcript of Records.

For the bachelor's degree program "Physics"

- A 4. (ASIIN 4.3) It is necessary to provide a device, which measures the radioactivity to guarantee the safety of all persons in the laboratory.

Recommendations

For all degree programs

- E 1. (ASIIN 1.3) It is recommended to increase the use of English in the classroom (reading materials, presentations, reports, slides, discussions, laboratory instructions, etc.).
- E 2. (ASIIN 1.3) The experts encourage UNILA the increased usage and training courses of international software standards, especially LaTeX, but also other open source products like UNIX, R, Python, Gimp and others.

- E 3. (ASIIN 2.1) It is recommended to improve the distribution of information on internships.
- E 4. (ASIIN 2.1) It is recommended to increase the student mobility by providing better facilities and structural support from the faculty/university.
- E 5. (ASIIN 2.1) It is recommended to improve the collaborations with the industry (non-governmental) to give the students more diverse insights during their internships.
- E 6. (ASIIN 2.3) It is recommended to increase the use of “inverted classroom” as a teaching method (including in English language).
- E 7. (ASIIN 5.3) It is recommended to improve the distribution of information on the study program and its regulations in English on the webpage.

For the bachelor’s degree program “Physics”

- E 11. (ASIIN 2.3) It is recommended to reduce the number of students for group work in the laboratories.
- E 12. (ASIIN 4.3) It is recommended to increase the number of technicians in the different laboratories.
- E 13. (ASIIN 4.3) It is recommended to establish a management team to take care of the laboratory for “Material Physics.”

H Decision of the Accreditation Commission (08.12.2023)

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

The Accreditation Commission discusses the procedure and focuses on the requirement and recommendations suggested by the experts and the changes made by the Technical Committees. The Accreditation Commission follows the changes of Technical Committee 12 and decides to delete the recommendation E6 and rephrase E9 (now E8). In addition, the Accreditation Commission consider it sufficient to mention LaTeX in E2 and refer to additional open course software.

The Accreditation Commission decides to award the following seals:

Degree Program	ASIIN Seal	Maximum duration of accreditation	Subject-specific label	Maximum duration of accreditation
Ba Mathematics	With requirements for one year	30.09.2029	–	-
Ba Physics	With requirements for one year	30.09.2029	–	-

Requirements

For all degree programs

- A 1. (ASIIN 2.2) Develop a mechanism to assess the total workload of each module and the total workload of students per semesters. The credits of each module has to match the awarded workload.
- A 2. (ASIIN 3) Formalize the exam regulations in case of illness.
- A 3. (ASIIN 2.2 & 5.2) A conversion from Indonesian to the ECTS credit points should be added to the Transcript of Records.

For the bachelor's degree program "Physics"

- A 4. (ASIIN 4.3) It is necessary to provide a device, which measures the radioactivity to guarantee the safety of all persons in the laboratory.

Recommendations

For all degree programs

- E 1. (ASIIN 1.3) It is recommended to increase the use of English in the classroom (reading materials, presentations, reports, slides, discussions, laboratory instructions, etc.).
- E 2. (ASIIN 1.3) The experts encourage UNILA the increased usage and training courses of international software standards, especially LaTeX, and other open source products.
- E 3. (ASIIN 2.1) It is recommended to improve the distribution of information on internships.
- E 4. (ASIIN 2.1) It is recommended to increase the student mobility by providing better facilities and structural support from the faculty/university.
- E 5. (ASIIN 2.1) It is recommended to improve the collaborations with the industry (non-governmental) to give the students more diverse insights during their internships.
- E 6. (ASIIN 5.3) It is recommended to improve the distribution of information on the study program and its regulations in English on the webpage.

For the bachelor's degree program "Mathematics"

- E 7. (ASIIN 1.1) It is recommended to restructure the specializations ("groups") into "Pure Mathematic", "Applied Mathematic" and "Statistics" to increase the understanding of stakeholders of the graduates' qualifications.
- E 8. (ASIIN 1.3) It is recommended to implement changes in the field of data science into the curriculum.
- E 9. (ASIIN 4.3) It is recommended to improve the student spaces on campus to facilities their group work, social gatherings, etc.

For the bachelor's degree program "Physics"

- E 10. (ASIIN 2.3) It is recommended to reduce the number of students for group work in the laboratories.
- E 11. (ASIIN 4.3) It is recommended to increase the number of technicians in the different laboratories.
- E 12. (ASIIN 4.3) It is recommended to establish a management team to take care of the laboratory for "Material Physics."

I Fulfilment of Requirements (24.09.2024)

Analysis of the experts and the Technical Committees (11.09.2024)

Requirements

For all degree programmes

- A 1. (ASIIN 2.2) Develop a mechanism to assess the total workload of each module and the total workload of students per semesters. The credits of each module has to match the awarded workload.

Initial Treatment	
Experts	<p>not fulfilled</p> <p>Vote: anonymous</p> <p>Justification: In its response, UNILA provides some cumulative data on workload per semester, but apparently, the actual workload per course has not yet been evaluated.</p> <p>To collect the data, they conducted an online survey through Google Form among the students. However, it is a questionnaire that does not contain specific questions about the time that students spend on understanding the content of lectures and exercises. Therefore, the experts do not consider it a reliable method to assess the total workload of students. The choices offered in this questionnaire ("less, medium, enough, a lot, very much") to assess the workload can only give a rough picture of what students think about their subjective workload, but it is not a reliable and objective method to assess the specific workload. For more meaningful results, the questionnaire should include specific questions and ask how much time students generally spend learning lecture material per lecture and how much time they spend preparing for exams. The experts encourage UNILA to provide a more "time-specific questionnaire".</p>

TC 12	not fulfilled Vote: unanimous Justification: The TC agrees with the experts' assessment that the requirement is not yet fulfilled. They expect that UNILA directly asks the students about their workload (including the time needed for self-studies) in each course.
TC 13	not fulfilled Vote: unanimous Justification: The Technical Committee follows the assessment of the experts.

A 2. (ASIIN 3) Formalize the exam regulations in case of illness.

Initial Treatment	
Experts	Fulfilled Justification: UNILA provides an issued regulation related to students who are unable to take exams for important reasons, e.g. illness, calamity, assignments from universities / government institutions. In order to take the make-up exam, the student must present the official letter of excuse and the exam must be taken before the end of score entry. The date and time of the make-up exam will be communicated to the student by the instructor of the course. The regulation is stated on the Dean of FMIPA Regulation No. 214/UN.26.17/PP/2024.
TC 12	fulfilled Vote: unanimous Justification: The Technical Committee follows the assessment of the experts.
TC 13	fulfilled Vote: unanimous Justification: The Technical Committee follows the assessment of the experts.

A 3. (ASIIN 2.2 & 5.2) A conversion from Indonesian to ECTS credit points should be added to the Transcript of Records.

Initial Treatment	
Experts	Fulfilled Justification: The university provides sample Transcript of Records for both programs. The conversion from Indonesian SKS to ECTS credits has been added and seems to be in place.
TC 12	fulfilled Vote: unanimous Justification: The Technical Committee follows the assessment of the experts.
TC 13	fulfilled Vote: unanimous Justification: The Technical Committee follows the assessment of the experts.

For the Bachelor's programme Physics

A 4. (ASIIN 2.2 & 5.2) A conversion from Indonesian to the ECTS credit points should be added to the Transcript of Records.

Initial Treatment	
Experts	Fulfilled Justification: The included pictures of the nuclear physics lab show the newly installed radiation dosimeter for the experiment with a nuclear radiator and are useful and ok. UNILA also provides overview photos. The experts are very satisfied with all the other changes in the laboratories. They will significantly improve safety. Their only comment is that the lights should not be turned off, because if it is dark outside or the room has no windows, nothing can be seen. In addition, there should be a sign on the wall about 2 meters above the fire detectors so that everyone can see it immediately.
TC 13	fulfilled Vote: unanimous Justification: The Technical Committee follows the assessment of the experts.

Decision of the Accreditation Commission (24.09.2024)

Degree programme	ASIIN-label	Subject-specific label	Accreditation until max.
Ba Mathematics	Requirement A1 not fulfilled	-	Prolongation for six months
Ba Physics	Requirement A1 not fulfilled	-	Prolongation for six months

The Accreditation Commission justifies its decision as follows:

“To collect the data, they conducted an online survey through Google Form among the students. However, it is a questionnaire that does not contain specific questions about the time that students spend on understanding the content of lectures and exercises. Therefore, the experts do not consider it a reliable method to assess the total workload of students. The choices offered in this questionnaire ("less, medium, enough, a lot, very much") to assess the workload can only give a rough picture of what students think about their subjective workload, but it is not a reliable and objective method to assess the specific workload. For more meaningful results, the questionnaire should include specific questions and ask how much time students generally spend learning lecture material per lecture and how much time they spend preparing for exams.”

J Fulfilment of Requirements (25.03.2025)

Analysis of the experts and the Technical Committees (10.03.2025)

Second Treatment	
Experts	<p>fulfilled</p> <p>Justification: The university has provided evidence of a new system for the calculation of the workload of the courses taken by the students, which consists of eight questions. This system has already been integrated into Universitas Lampung's SIAKADU (Integrated Academic System).</p> <p>The experts believe that this new system is suitable for assessing students' lecture-specific workload, taking into account face-to-face time as well as preparation time for work placements and study time at home. According to the experts, the questionnaire could be improved in the future by including the option of free text instead of specific time slots.</p>
TC 12	<p>fulfilled</p> <p>Vote: unanimous</p> <p>Justification: The TC follows the assessment of the experts.</p>
TC 13	<p>fulfilled</p> <p>Vote: unanimous</p> <p>Justification: The TC follows the assessment of the experts.</p>
AC	<p>fulfilled</p> <p>Vote: unanimous</p> <p>Justification: The TC follows the assessment of the experts.</p>

Decision of the Accreditation Commission (25.03.2025)

Degree programme	ASIIN-label	Accreditation until max.
Ba Mathematics	All requirements fulfilled	30.09.2029
Ba Physics	All requirements fulfilled	30.09.2029

Appendix: Program Learning Outcomes and Curricula

According to self-assessment report, the following **objectives** and **program learning outcomes (intended qualifications profile)** shall be achieved by the bachelor's degree program "Mathematics":

Objectives

- a. Producing graduates who are equipped with the conceptual understanding of mathematics and determined personality required to use quantitative reasoning and analysis effectively in their personal, professional, and community lives.
- b. Producing an innovative scientific community that fostering creativity, productivity, critical and open-minded thinking, high integrity, and responsiveness to social changes.
- c. Producing graduates who are equipped with strong mathematics both as a discipline and as a tool, computational and related technology skills to solve real-world problems in various fields and to allow them to pursue a higher degree or graduate program, and equipped with effective written and oral communication skills in a mathematical setting.
- d. Producing graduates with a broad foundation of knowledge and skills to cultivate a commitment to life-long learning.
- e. Establishing collaboration with government and non-government, as well as other higher education institutions, in both the country and abroad.

Program learning outcomes (PLOs):

Attitude	PLO 1	Having piety to God Almighty, having a sense of awareness and responsibility to the nation and state based on the values of the Pancasila
	PLO2	Internalizing attitudes; punctuality; learning and cooperative methods; and internalizing the spirit of responsibility, independence, struggle, and entrepreneurship
General skills	PLO3	Able to adapt, innovate and to contribute based on the framework of scientific method in the context of the development of global science and technology while paying attention to humanity aspects
	PLO4	Able to communicate orally and verbally in international language (English).

Special skills	PLO5	Able to communicate and develop mathematical thinking, from mastering procedure/computation to mastering application, including exploration, logical reasoning, generalization, abstraction, and formal proof.
	PLO6	Able to observe, identify, formulate, and solve a problem through mathematical approach by deploying technologies.
	PLO7	Able to structurally reconstruct/modify, analyze/think the system/problem to the mathematical model, and to assess the accuracy and interpret the results.
	PLO8	Able to make right decisions by using various alternatives of available mathematical problem-solving.
	PLO9	Able to collaborate, adapt, and be a lifelong learner.
	PLO10	Able to apply the fields of analysis, algebra, operation research, statistics, and applied mathematics to solve problems in the local, regional, national or international scope.
Knowledge	PLO11	Mastering concepts and theories of mathematics including mathematical logic, discrete mathematics, algebra, analysis, geometry, and probability, and statistics.
	PLO12	Mastering the principles of mathematical modeling, linear programming, differential equations, and numerical methods using mathematics/ statistics software, including open source based software.

0 Appendix: Program Learning Outcomes and Curricula

The following **curriculum** is presented:

NO	COURSES		CREDIT UNIT	P L O 1	P L O 2	P L O 3	P L O 4	P L O 5	P L O 6	P L O 7	P L O 8	P L O 9	P L O 10	P L O 11	P L O 12
	COURSE CODE	COURSE TITLE													
SEMESTER 1															
1	UNI620101	Religion Education	3(2-1)	√	√										
2	UNI620109	Local Ethics and Local Wisdom	2(2-0)	√	√										
3	UNI620108	Pancasila	2(2-0)	√	√										
4	MIP620101	Basic Sciences	2(2-0)		√	√									
5	MAT620101	Calculus 1	3(2-1)			√		√	√	√	√				
6	MAT620102	Logics and Set	3(2-1)			√		√	√	√				√	
7	MAT620103	Basic Statistics	2(2-0)					√	√	√			√	√	
8	MAT620104	Mathematics Appreciation	3(2-1)			√	√	√	√						
9	MAT620110	English	2(2-0)				√								
			22(18-4)												
SEMESTER 2															
1	MAT620104	Calculus 2	3(2-1)					√	√	√	√			√	
2	MAT620105	Geometry	3(2-1)					√	√	√	√			√	
3	MAT620106	Algorithm and Programming	3(2-1)			√		√	√					√	
4	MAT620107	Elementary Linear Algebra	3(2-1)			√		√	√					√	
5	MAT620108	Introduction to Probability Teory	3(2-1)					√	√					√	
6	MAT620109	Discrete Mathematics	3(2-1)					√	√	√				√	
7	UNI620106	Indonesian Language	3(2-1)		√										
8	UNI620107	Citizenship	2(2-0)		√										
			22(16-6)												
SEMESTER 3															
1	MAT620201	Calculus 3	3(2-1)					√	√	√	√			√	
2	MAT620202	Multivariable Calculus	3(2-1)					√	√	√	√			√	
3	MAT620203	Algebraic Structure 1	3(2-1)					√	√				√	√	
4	MAT620204	Linear Programming	3(2-1)					√	√	√					√
5	MAT620205	Mathematical Statistics I	3(2-1)					√	√					√	
6	MAT620206	Number Theory	3(2-1)			√		√	√		√			√	

0 Appendix: Program Learning Outcomes and Curricula

7	MAT620207	Applied Linear Algebra	3(2-1)					√	√	√			√		
8	MAT620208	Semigroup	3(2-1)					√	√				√	√	
9	MAT620209	Graph Theory	3(2-1)					√	√	√			√		
10	MAT620210	Statistical Method	3(2-1)						√	√			√	√	
11	MAT620211	Experimental Design	3(2-1)					√	√	√			√		
12	MAT620212	Matrix Algebra of Statistics	3(2-1)					√	√	√			√	√	
13	MAT620213	Data Exploration	3(2-1)					√	√	√		√			
SEMESTER 4															
1	MAT620214	Introduction to Numerical Analysis	3(2-1)					√	√	√	√				√
2	MAT620215	Ordinary Differential Equation	3(2-1)						√	√	√				√
3	MAT620216	Algebraic Structure II	3(2-1)					√	√				√	√	
4	MAT620217	Mathematical Statistics II	3(2-1)					√	√					√	
5	UNI620209	Entrepreneurship	3(2-1)		√										
6	MAT620218	Introduction to Real Analysis I	3(2-1)					√			√		√	√	
7	MAT620219	Operation Research	3(2-1)					√	√	√	√			√	√
8	MAT620220	Finite Group Theory	3(2-1)					√	√				√	√	
9	MAT620221	Vector Analysis	3(2-1)					√	√					√	
10	MAT620222	Analysis and Survey Design	3(2-1)					√	√	√	√		√	√	
11	MAT620223	Introduction to Data Mining	3(2-1)					√	√	√		√	√		
12	MAT620224	Introduction to Stochastics	3(2-1)					√	√	√			√	√	
13	MAT620225	Regression Analysis	3(2-1)					√	√	√	√		√	√	
SEMESTER 5															
1	MAT620301	Introduction to Real Analysis II	3(2-1)					√			√		√	√	
2	MAT620302	Scientific Computation	3(2-1)					√	√	√	√				√
3	FEB620160	General Management	3(2-1)		√										
4	MAT620303	Complex Function	3(2-1)					√			√		√	√	√
5	MAT620304	Mathematical Modelling	3(2-1)					√	√	√	√				√
6	MAT620305	Partial Differential Equation	3(2-1)						√	√	√				√
7	MAT620306	Introduction to Dynamical System	3(2-1)						√	√	√				√
8	MAT620307	Optimization	3(2-1)					√	√	√	√		√		√
9	MAT620308	Modul Theory	3(2-1)					√	√				√	√	
10	MAT620309	Simulation	3(2-1)					√	√	√	√		√	√	
11	MAT620310	Time Series Analysis	3(2-1)						√	√	√	√	√		
12	MAT620311	Introduction to Linear Model	3(2-1)					√	√	√		√	√	√	
SEMESTER 6															
1	MAT620312	Field Work Practice	3(0-3)	√	√	√	√						√	√	√
2	MAT620313	Research Methodology and Literature Review	3(2-1)		√	√	√	√							
3	MAT620314	Introduction to Topology	3(2-1)					√			√		√	√	
4	MAT620315	Introduction to Functional Analysis	3(2-1)					√			√		√	√	
5	MAT620316	Advanced Linear Algebra	3(2-1)					√	√	√			√	√	
6	MAT620317	Queueing Theory	3(2-1)					√	√	√	√			√	√
7	MAT620318	Financial Mathematics	3(2-1)							√	√		√	√	
8	MAT620319	Multivariate Analysis	3(2-1)					√	√	√	√		√	√	
9	MAT620320	Econometrics	3(2-1)						√	√	√		√		
10	MAT620321	Statistics and Data Sciences	3(2-1)					√	√	√	√		√		√
11	MAT620322	Categorical Data Analysis	3(2-1)					√	√	√			√		
12	MAT620323	Statistics for Quality Control	3(2-1)					√	√	√			√		
SEMESTER 7															
1	MAT620401	Project Proposal Seminar I	1(0-1)			√	√					√	√	√	√
2	MAT620402	Project Proposal Seminar II	1(0-1)			√	√					√	√	√	√
3	UNI620401	Community Service Program	3(0-3)	√	√	√							√	√	√
4	MAT620403	Scientific Writing	2(2-0)		√	√	√								
5	MAT620404	Capita Selecta of Analysis	3(2-1)					√	√	√			√	√	
6	MAT620405	Capita Selecta of Algebra	3(2-1)					√	√	√			√	√	
7	MAT620406	Capita Selecta of OR and Combinatorics	3(2-1)					√	√	√	√		√		√

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8	MAT620407	Capita Selecta of Applied Mathematics	3(2-1)					√	√	√	√		√		√
9	MAT620408	Capita Selecta of Statistics	3(2-1)					√	√	√	√		√	√	√
10		Other courses in other study program (Max credit unit 6)	6												
SEMESTER 8															
1	MAT620409	Thesis	4(0-4)	√	√	√							√	√	√
2		Other courses in other study program (Max credit unit 6)	6												

According to self-assessment report, the following **objectives** and **program learning outcomes (intended qualifications profile)** shall be achieved by the bachelor's degree program "Physics":

Objectives:

- "Produce graduates who are ready to apply their knowledge in the fields of instrumentation, materials, and energy physics in the era of the industrial revolution 4.0 and able to continue their education to the postgraduate level;
- produce and develop science and technology in the fields of instrumentation, physics, materials, and energy to manage local resources; establish mutually beneficial cooperation with government/private institutions in utilizing the physics of instrumentation, materials, and energy."

Program learning outcomes (PLOs):

Attitude	PLO 1	Implement religious and Pancasila values in daily life
	PLO 2	Internalize attitudes, time management, learning and collaboration techniques, responsibility, independence, struggle, and entrepreneurship
General skills	PLO 3	Able to adapt, innovate and contribute within the framework of the scientific method for the development of global science and technology by paying attention to the humanities aspects
	PLO 4	Able to communicate orally and in writing in Indonesian and English
Special skills	PLO 5	Mastering the concepts of classical physics and familiar with the fundamentals of quantum, atomic and molecular, nuclear, elementary particle, and solid-state physics and their application in various examples of problems

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	PLO 6	Able to apply knowledge of physics to various fields (material physics, instrumentation physics, or energy physics), act in professional activities (technology or industry), and able to recognize new trends in the field of physics.
Knowledge	PLO 7	Able to formulate various problems in life using mathematics and physics concepts, analyze scientifically, theoretically, or experimentally, and disseminate them.
	PLO 8	Able to use a computer for programming, computing, modeling, and simulating as a tool to solve problems in research, industry, and professional activity

The following **curriculum** is presented:

Semester: 1

No.	Course Code	Course Title	SCU	Attitude		General Skill		Special Skills		Knowledge	
				PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
1	UNI62010X	Religion	3	√							
2	UNI620108	Pancasila	2	√							
3	MIP620103	Ethics and Local Wisdom	2		√						
4	MIP620101	Basic Sciences	2			√					
5	FIS620101	Elementary Physics 1	3			√					
6	FIS620102	Elementary Physics Experiments 1	1			√					
7	FIS620103	Mathematics	2			√					
8	FIS620104	English	2				√				
9	FIS620105	Elementary Chemistry	2			√					
10	FIS620106	Elementary Chemistry Experiments	1			√					
		Total	20								

Semester: 2

No.	Course Code	Course Title	SCU	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
1	UNI620106	Indonesian Language	2		√						
2	UNI620107	Citizenship education	2		√						
3	FIS620107	Elementary Physics 2	3			√					
4	FIS620108	Elementary Physics Experiment 2	1			√					
5	FIS620109	Computer Programming	2								√
6	FIS620110	Computer Programming Experiments	1								√

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7	FIS620111	Advanced Mathematics	3			√					
8	FIS620112	Information Technology	2								√
9	FIS620113	Information Technology Experiments	1								√
10	FIS620114	Measurement and Calibration Methods	2							√	
11	FIS620115	Measurement and Calibration Methods Experiments	1							√	
		Total	20								

Semester: 3

No.	Course Code	Course Title	SCU	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
1	FIS620201	Mechanics	4					√			
2	FIS620202	Mathematical Physics 1	4					√			
3	FIS620203	Modern Physics	3					√			
4	FIS620204	Electronics	3					√			
5	FIS620205	Electronics Experiments	1					√			
6	UNI620209	Entrepreneurship	3		√		√				
7	FIS620207	Analyse and Data Processing	2							√	
		Total	20								

Semester: 4

No.	Course Code	Course Title	SCU	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
1	FIS620206	Electromagnetics	3					√			
2	FIS620208	Mathematical Physics 2	4					√			
3	FIS620209	Waves	3					√			
4	FIS620210	Experimental Physics	2					√			
5	FIS620211	Research Method	2				√	√			
6	FIS620212	Thermodynamics	3					√			
7	FIS620213	Computational Physics	2								√
8	FIS620214	Computational Physics Experiments	1								√
		Total	20								

Semester: 5

No.	Course Code	Course Title	SCU	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
1	FIS620301	Quantum Physics	4					√			
2	FIS620302	Nuclear Physics	2					√			
3	FIS620303	Nuclear Physics Experiments	1					√			
4	FIS620304	Solid State Physics	3					√			
5	FIS620305	Introduction Sensor Technology	2					√			
6	FIS620306	Statistical Physics	3					√			
7	UNI620301	Community Service Program	3							√	
		Elective Courses	2						√		
		Total	20								

Semester: 6

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1	FIS620325	Metal and Corrosion	2						√		
2	FIS620326	Metal and Corrosion Experiments	1						√		
3	FIS620327	Introduction of Nonlinear Optics	2						√		
4	FIS620328	Composites	2						√		
5	FIS620329	Composites Experiments	1						√		
6	FIS620330	Introduction of Polymer	2						√		
7	FIS620331	Introduction of Polymer Experiments	1						√		
8	FIS620332	Introduction of Superconductor	2						√		
9	FIS620333	Introduction of Ceramics	2						√		
10	FIS620334	Introduction of Thin Layer	2						√		
11	FIS620335	Introduction of Thin Layer Experiments	1						√		
		Peer Group: Instrumentation							√		
1	FIS620314	Microcontroller and Microcomputer	2						√		
2	FIS620315	Microcontroller and Microcomputer Experiments	1						√		
3	FIS620316	Sensor and Actuator	2						√		
4	FIS620317	Sensor and Actuators Experiments	1						√		
5	FIS620318	Artificial Intelligence	2						√		
6	FIS620319	Medical Instrumentation	2						√		
7	FIS620320	Medical Instrumentation Experiments	1						√		
8	FIS620321	Acquisition and Transmission System	2						√		
9	FIS620322	Acquisition and Transmission System Experiments	1						√		
10	FIS620323	Industrial Instrumentation	2						√		
11	FIS620324	Digital Imaging	2						√		

Semester: 7

No.	Course Code	Course Title	SCU	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
		Peer Group: Energy Physics									
1	FIS620422	Reactor Dynamics	2						√		
2	FIS620423	Nuclear Reactor Modelling and Simulation	2						√		
3	FIS620424	Nuclear Reactor Modelling and Simulation Experiments	1						√		
4	FIS620425	Health and Safety Environment	3						√		
5	FIS620426	Transmission and Distribution of Energy	2						√		
6	FIS620427	Power Plan Design	2						√		
7	FIS620428	Power Plan Design Experiments	1						√		
8	FIS620429	Workshop of Energy Physics	2						√		
9	FIS620430	Environmental impact assessment	3						√		
10	FIS620431	Power Plan Industry Management	2						√		

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		Peer Group: Material Physics										
1												
2	FIS620411	Sensor Materials	2						√			
3	FIS620412	Sol Gel	2						√			
4	FIS620413	Sol-Gel Experiments	1						√			
5	FIS620414	Material Structure Analysis	2						√			
6	FIS620415	Material Structure Analysis Experiments	1						√			
7	FIS620416	Introduction of Magnetic Materials	2						√			
8	FIS620417	Nano Materials	2						√			
9	FIS620418	Nano Materials Experiments	1						√			
10	FIS620419	Physical Properties	2						√			
11	FIS620420	Physical Properties Experiments	1						√			
12	FIS620421	Mechanical Properties	2						√			
		Peer Group: Instrumentation										
1	FIS620401	Control System	2						√			
2	FIS620402	Control System Experiments	1						√			
3	FIS620403	Instrumentation Design and Modelling	2						√			
4	FIS620404	Instrumentation Design and Modelling Experiments	1						√			
5	FIS620405	Expert System	2						√			
6	FIS620406	Workshop of Instrumentation	2						√			
7	FIS620407	Optoelectronics	2						√			
8	FIS620408	Analytical Instrumentation	2						√			
9	FIS620409	Agricultural Instrumentation	2						√			
10	FIS620410	Physiological Signal Analysis	2						√			