ASIIN Seal

Accreditation Report

Bachelor's Degree Programmes
Physics
Geophysics

Master's Degree Programme
Physics

Provided by
Universitas Padjajaran

Version: 24 September 2024

Table of Content

A About the Accreditation Process

Name of the degree programme (in original language)	(Official) English translation of the name	Labels applied for [1]	Previous accreditation (issuing agency, validity)	Involved Technical Committees (TC)[2]
Program Studi Sarjana Fisika	Undergraduate Program in Physics	ASIIN	LAMSAMA until: 12/21/2027	13
Program Studi Sarjana Geofisika	Undergraduate Program in Geophysics	ASIIN	LAMSAMA until: 12/21/2027	11, 13
Program Studi Magister Fisika	Master Program in Physics	ASIIN	BAN-PT until: 09/07/2026	11, 13
Date of the contract: 10.02.2023 **Submission of the final version of the self-assessment report:** 08.01.2024 **Date of the onsite visit:** 15-16.05.2024 **at: Jatinangor Campus**				
Expert panel: Prof. Dr. Arno Schindlmayr, Paderborn University Prof. Dr. Bülent Tezkan, University of Cologne Dr. Herri Trilaksana, Universitas Airlangga Dr. Bernhard Flöter, Volkswagen AG Jihan Shafiyah, student at Brawijaya University				
Representative of the ASIIN headquarter: Paulina Petracenko				

[1] ASIIN Seal for degree programmes

[2] TC: Technical Committee for the following subject areas: TC 11 - Geosciences; TC 13 - Physics.

Responsible decision-making committee: Accreditation Commission for Degree Programmes	
Criteria used: European Standards and Guidelines as of May 15, 2015 ASIIN General Criteria, as of December 07, 2021 Subject-Specific Criteria of Technical Committee 13 – Physics as of March 20, 2020 Subject-Specific Criteria of Technical Committee 11 – Geosciences as of December 9, 2011	

B Characteristics of the Degree Programmes

a) Name	Final degree (original/English translation)	b) Areas of Specialization	c) Corresponding level of the EQF[3]	d) Mode of Study	e) Double/Joint Degree	f) Duration	g) Credit points/unit	h) Intake rhythm & First time of offer
Ba Physics	S.Si./B.Sc.		6	Full time	/	8 Semester	144 credits/260.64 ECTS	August, 1959
Ba Geophysics	S.Si./B.Sc.		6	Full time	/	8 Semester	144 credits/260.64 ECTS	August, 2011
Ma Physics	M.Si./M.Sc		7	Full time	/	4 Semester	67 credits/121.16 ECTS	February, 2019

For the Bachelor's degree programme Physics the institution has presented the following profile in the Academic Guidelines for the study programme:

„**Vision**:

Become an Excellent Physics Undergraduate Study Program at the International Level in 2024 that focuses on the fields of Energy, Health, and the Environment.

Mission:

1. Realizing education that produces superior and internationally competitive graduates in the fields of energy, environment and health.
2. Realizing education that produces graduates who master the basic concepts of physics to be applied in the field of engineering.
3. Realizing education that produces graduates who are adaptive to the development of science and technology and have an entrepreneurial spirit.
4. Forming academic people who have a culture of RESPECT (Responsibility, Excellence, Scientific, Professionalism, Encouragement, Creative, and Trust).

Objectives:

1. Generating excellent and internationally graduates competitive in the fields of energy, environment and health.

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

2. Generating graduates who master the basic concepts of physics to be applied in the field of engineering.
3. Generating graduates who are adaptive to the development of science and technology and have an entrepreneurial spirit.
4. Generating graduates who have a culture of RESPECT (Responsibility, Excellence, Scientific, Professionalism, Encouragement, Creative, and Trust).''

For the Bachelor's degree programme Geophysics the institution has presented the following profile in the Academic Guidelines for the study programme:

„**Vision**:

'To become a Geophysics Study Program that excels in providing education and research in the field environmental geophysics at regional level in 2026.'

Mission:

1. Carrying out education and teaching to produce graduates who master geophysical science and its applications, are skilled at communicating and are competitive at the regional level.
2. Carrying out research in the field of scientific and applied geophysics that contributes to solving environmental problems.
3. Organizing research-based services to overcome environmental problems in society.
4. Building and developing collaboration in the fields of education and research with domestic and foreign institutions.

Objectives:

The aim of the Geophysics undergraduate program is to develop students who are able to:

1. Apply principles of physics, mathematics, geology and other related sciences to analyze and interpret geophysical data, as well as to identify and analyze the physical properties of rocks and minerals (O-1).
2. Conduct survey design and data acquisition using various geophysical methods with mapping, GIS and instrumentational support and apply computational methods for processing and modeling geophysical data (O-2).
3. Communicate effectively in scientific written and oral presentations, work collaboratively in multidisciplinary teams and society in general, with admiration to ethical and environmental considerations, and utilize geophysical data and modeling to solve environmental problems (O-3)."

For the Master's degree programme Physics the institution has presented the following profile in the Academic Guidelines for the study programme:

"A. Vision:

Become a Master Program in Physics that is excellent at the international level in 2024 which focuses on Instrumentation, Materials, Energy and Geophysics and has an Impact on Society.

B. Mission:

1. Realizing education to produce graduates who master physics and its applications, are skilled at communicating and have an entrepreneurial spirit and are competitive at the international level.
2. Building an academic atmosphere that is conducive to the implementation of the education and research process.
3. Increasing the scientific contribution of Physics and its applications to society.
4. Build and develop collaboration with domestic and foreign institutions to improve the quality of education, research and community service.
5. Forming academic people who have a culture of RESPECT (Responsibility, Excellence, Scientific, Professionalism, Encouragement, Creative, and Trust).

C. Objectives of the Study Program:

1. To provide graduates who are able to master advanced physics and its applications, capable of communicating science to the community, have entrepreneurial skills, and are able to compete at the international level.
2. To create an excellent academic atmosphere for the implementation of the education and research process.
3. To provide graduates who contribute to society with their knowledge of physics and its applications.
4. To establish collaboration with domestic and foreign institutions to improve the quality of education, research, and community service.
5. To provide graduates with a culture of RESPECT (Responsibility, Excellence, Scientific, Professionalism, Encouragement, Creative, and Trust)."

C Expert Report for the ASIIN Seal[4]

1. The Degree Programme: Concept, Content & Implementation

Criterion 1.1 Objectives and Learning Outcomes of a Degree Programme (Intended Qualifications Profile)

Evidence:

- Self-Assessment Report
- Study plans of the degree programmes
- Module descriptions
- Academic Guidelines per programme
- Objective-module-matrix per programme
- Websites of all study programmes
- Discussion during the audit

Preliminary assessment and analysis of the experts:

The experts refer to the Subject-Specific Criteria (SSC) of the Technical Committee Physics and the Technical Committee Geosciences as a basis for judging whether the intended learning outcomes of the three programmes correspond with the competences as outlined by the SSCs.

In general, the experts note that the programme learning outcomes including the objective-module-matrices can be found on the websites of the three study programmes, in the respective Academic Guidelines and Diploma Supplement as well as in the Self-Assessment Report. They confirm that the intended learning outcomes are transparently anchored and published and thus are available to students, lecturers and interested third parties. They also agree that the learning outcomes are described in a clear and concise manner. However, they note that the programme learning outcomes in the self-assessment report differ from those in the Diploma Supplements. The experts therefore require UNPAD to ensure

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

that all documents contain the same version of the programme learning outcomes and objectives.

According to the Self-Assessment Report, graduates of the Bachelor's programme in Physics should possess the following competences and skills:

1. "To be able to identify and explain the foundations of physics, including classical and modern physics, computational, experimental, and applied physics.
2. To be able to solve simple and practical problems by applying physics theories, computation, and experimental methods in the fields of energy, environment, and health.
3. To be able to analyze simple and practical problems in one of the fields of theoretical, computational, or experimental physics for energy, environment, and health.
4. To be able to carry out definitive scientific tasks and demonstrate the results orally and in writing in the fields of theoretical physics, applied physics, computation, or experiments, and their applications in the fields of energy, environment, and health.
5. To be able to use the principle of lifelong learning to enhance knowledge and stay updated on current issues related to physics in the fields of energy, environment, and health.
6. To be able to demonstrate religious and tolerant attitudes.
7. To be able to demonstrate an attitude of responsibility and commitment to law enforcement, ethics, community and environmental sustainability norms."

According to the Self-Assessment Report, graduates of the Bachelor's programme in Geophysics should possess the following competences and skills:

1. "Good comprehension, respect, and execution of the moral, social, environmental, and religious obligations associated with geophysical exploration and study.
2. Comprehensive knowledge of both geophysical and geoscience concepts and theories, including the concept of method of seismic, method of gravity magnetic, electric and electromagnetic methods, geodynamics, and dynamic process on earth.
3. Comprehensive understanding of the principles of instruments and equipment used in geophysical exploration and other support for geophysical works such as numerical method and computational geophysics, basic mapping, Geographic Information System and geostatistics.
4. Comprehensive understanding of mathematics and fundamental sciences such as physics, geology and chemistry and other related basic sciences as foundation for geophysics.

5. Good ability to work collaboratively and communicate effectively with colleagues, professionals from different disciplines and society as general in order to solve the problems.
6. Able to apply research methodology, provide independent and high quality results, and communicate the research results effectively through reports and presentations in accordance with scientific, technological and ethical principles.
7. Competent in showing independent, high-quality, measurable performance with high adaptability to different environmental work as well as logical, critical, systematic, and innovative thinking to develop and implement science and technology within their field.
8. The ability to carry out comprehensive geophysical measurements starting from survey design, determine the measurement lines, conduct data acquisition, processing and interpretation of the data based on geology and other supporting sciences.
9. The ability to conduct basic geological measurements as well as mapping, GIS and computational and instrumentation in general in order to support geophysical data acquisitions and interpretations.
10. The ability to integrate geophysical methods in the field of environment and disaster comprehensively as well as solving the cases arises in exploration and fundamental geophysics."

According to the self-assessment report, graduates of both bachelor's programmes are able to work in research, academia and industry. In addition, graduates have the opportunity to continue their studies with a Master's degree in Physics at UNPAD. During the audit, the experts ask why there is no Master's degree in geophysics. They learn that the Department of Geophysics is in the process of establishing a Master's degree. However, they have not yet fully met the ministerial requirements for opening a Master's programme, which stipulate that there must be a minimum of five lecturers with a PhD degree and two full professors among the teaching staff. The coordinators of the programme expect to meet the requirements by next year and to be able to admit the first students. The experts are pleased to hear that the department is in the process of development and plans to expand the studies dedicated to geophysics.

According to the Self-Assessment Report, graduates of the Master's programme in Physics should possess the following competences and skills:

1. "To be able to formulate and analyze problems in instrumentation, materials, energy, and geophysics.
2. To be able to apply physics theories, computations, and experimental methods to solve complex problems in instrumentation, materials, energy, and geophysics.
3. To be able to communicate their works and scientific ideas orally and in writing.

4. To be able to collaborate, take responsibility in teamwork, and display academic leadership.
5. To be able to use long-life learning principles to enhance their knowledge and actual issues in physics in the fields of instrumentation, materials, energy, and geophysics.
6. To be able to demonstrate a sense of responsibility and commitment to upholding the law, ethics, social norms, and environmental sustainability."

Master's degree graduates are able to find an occupation in academia, research an industry or pursue a PhD.

The experts review the documents and confirm that the level of the objectives and intended learning outcomes of the three programmes adequately reflect EQF levels 6 and 7 respectively. The programmes also meet the ASIIN Subject Specific Criteria (SSC) of the Physics Technical Committee and the Geosciences Technical Committee. Overall, the reviewers consider that the targeted skill profiles of the three programmes under review will enable graduates to find appropriate employment both in Indonesia and globally.

The positive impression of the reviewers is echoed by industry representatives. During the audit, they reported that they were generally satisfied with the qualification profile and level of the graduates. They add that UNPAD graduates have very good technical and analytical skills, which makes them suitable employees. However, they see room for improvement in their practical skills. Alumni confirm that the programmes under review have a strong theoretical component, while applied practice is rather lacking in the programmes. As a result, graduates often need further practical training or guidance from their employer when entering the industry.

The experts agree with the alumni and industry representatives: While they appreciate the strong theoretical dimension in all three programmes under review, they also consider the number of credits for laboratory work to be relatively low, especially in the Bachelor's degree in Physics. For example, only 7 SKS (12.67 ECTS) are awarded for dedicated modules like Fundamental Physics Lab Work, Electronics Lab Work, Physics Experiments, Advanced Physics Experiments or Applied Physics Expertise Lab Work in the Bachelor's programme in Physics, although some other modules also contain practical elements. The experts refer to the SSC of the Technical Committee for Physics, which in turn refers to the Association of Physics Departments in Germany, which proposes 20–40 ECTS for laboratory-focused modules in a Bachelor's programme. Considering the significant contrast to the practical laboratory time suggested by the association as well as the feedback from industry partners and alumni, the experts recommend increasing the practical skills of students in the Bachelor's programme in Physics. In the other two programmes, the experts consider the practical skills of the students to be sufficient.

Furthermore, the experts point out that according to the presentation of the programme learning outcomes and objectives in the Academic Guidelines for the Bachelor's and Master's programme in Physics, one of the programme missions is "Realizing education that produces graduates who are adaptive to the development of science and technology and have an entrepreneurial spirit". However, this mission is not supported by the programme objectives, as neither the bachelor's nor the master's objectives refer to the acquisition of entrepreneurial skills. Moreover, the experts do not see this mission manifested in the two curricula, apart from a general first-semester course for all students. Therefore, the experts urge UNPAD to review the mission and objectives of the Bachelor's and Master's programmes and ensure that they are consistent with each other and with the curriculum.

In contrast, neither the mission nor the objectives of the Bachelor's programme in Geophysics refer to the acquisition of entrepreneurial skills. Yet, the curriculum proves that students do gain competences in related areas, such as project management. The experts therefore recommend including a reference to entrepreneurial skills as well so that future employers and other interested parties have a transparent and accurate overview of the graduate's competences.

Looking at the structure of the faculties, the experts notice that the Faculty of Geological Engineering also has a geophysics laboratory. During the audit, they ask about the links between the geophysics department and the geophysics laboratory of the geology faculty. The programme coordinators explain that the two faculties primarily work separately and independently. For example, the geophysics laboratory at the Faculty of Geology focuses entirely on geological studies that may have a geophysical aspect. However, there are sporadic collaborations and synergies. For example, students from the Bachelor of Geophysics can attend a lecture from the Geology Department on oil and mineral exploration. The experts now understand the division between the two departments and welcome the fact that students can broaden their knowledge in adjacent disciplines.

With regard to the review of objectives and learning outcomes, the experts learn that UNPAD has a systematical review cycle in place. According to this, every five years objectives and learning outcomes are extensively analysed and revised if necessary. The review also considers the feedback from students, alumni, industry partners and other interested parties.

In conclusion, the experts believe that the learning outcomes of the three degree programmes adequately reflect the intended level of academic qualification and correspond with the ASIIN Subject-Specific-Criteria (SSC) of the respective technical committees. They also confirm that UNPAD has established a systematic review of study programmes, including their programme learning outcomes and objectives.

Criterion 1.2 Name of the Degree Programme

Evidence:

- Self-Assessment Report
- Diploma Supplements

Preliminary assessment and analysis of the peers:
The experts confirm that the English translation and the original Indonesian names of the three degree programmes correspond with the intended aims and learning outcomes as well as the content of the respective degree programme.

Criterion 1.3 Curriculum

Evidence:

- Self-Assessment Report
- Study plans
- Module descriptions
- "Guidelines for recognizing Independent Campus Learning Activities Universitas Padjajaran"
- "MBKM Recognition Guidance"
- Discussions during the audit

Preliminary assessment and analysis of the experts:
Content & Structure of the Programmes

The Bachelor's programmes in Physics and Geophysics have a duration of four years each (8 semesters).

In the first year, students of the Bachelor's programme Physics must complete general courses on language, citizenship, religion, creativity and entrepreneurship and introductory courses on fundamental physics, mathematical and computational methods. The second academic year focuses on intermediate and advanced physics including electronics, electromagnetics, experimental physics, waves, quantum physics, and introduction to nuclear physics. In the third year, students deepen their technical knowledge attending courses on solid state physics, optics and statistical physics. In addition, they have the opportunity to take electives in the fields of instrumentation, materials, and energy. Moreover, in the sixth semester, students can participate in the MBKM programme offered and regulated by the ministry. In the framework of MBKM, students can participate in certified training or student exchange or carry out internships in industry, research institutions or educational institutions. These activities can be awarded up to 20 credits. The MBKM programme will be

explained in more detail below. In the fourth and final year, students take courses on specialized topics and research methodology in preparation of the final project, which is carried out in the eighth semester.

Furthermore, all Bachelor's students at UNPAD have to complete the compulsory module "Community Service Programme" (KKN). In this programme, students live in a community/village and participate in problem-solving by collaborating with locals as well as students from other degree programmes at UNPAD. The students' assessment is based on work plans, teamwork, discipline, programme implementation, and activity reports. The assessment is carried out by UNPAD teaching staff. The assessment rules refer to the KKN Guidelines of UNPAD.

During the audit, the experts learn that although the study programme promotes several distinguished specialisations, such as energy, environment or health, these are not taken in the form of tracks. Instead, all electives are combined and offered in a pool from which students can choose a number of courses without having to build a specific track. However, students are guided by their academic advisor in their choice of courses so that they can build up some expertise in a particular area if they wish. In fact, it is compulsory for every student to have a meeting with their advisor before choosing their electives. The academic advisor generally ensures that the courses taken by the student build on each other coherently and that they are relevant to the student's proposed thesis topic. The experts find the system acceptable and appreciate that an academic advisor accompanies students throughout their studies.

The Bachelor's programme Geophysics follows the same structure as the programme in Physics. In the first year, students are obliged to take general courses and introductory courses on physics, mathematics and basic geology. The second year focuses on fundamental geophysics such as seismic method, gravity and magnetic method, and electric and electromagnetic methods. Furthermore, in the second year, students attend field trips applying geophysical methods from data acquisition, data processing and interpretation. In the third year, students advance their knowledge in geophysics. They explore communication and research methodology and carry out projects and further field trips. The data obtained from the field work is used for data processing and signal processing. The fourth year is dedicated to the final project and further courses preparing students for the final project.

The Master's programme Physics has a duration of two years (4 semesters) and consists of 67 credits (121.16 ECTS). 36 credits are awarded for courses and 31 credits for scientific research and publication activities. In the first year, students take courses on classical and

modern physics which comprise elective courses in material physics, energy physics, instrumentation physics and geophysics, as well as supporting courses for the Master's project. In the second year, students take further courses and complete their final project.

The experts review the curricula and find that the three programmes are of high quality, meet international standards in physics and geophysics and correspond to the respective EQF levels. They also note that the three programmes cover the subjects essential to the discipline and provide a solid education for students in physics and geophysics. In addition, the expert group is convinced that the three programmes are well organised and structured so that students achieve the intended learning outcomes.

However, the experts identify a number of aspects that show that there is room for improvement. For instance, as mentioned in chapter 1.1, the experts remark that the curricula of the Bachelor's and Master's programmes in Physics do not include subject-specific units that contribute to the acquisition of entrepreneurial skills. However, these skills are included in the mission of both programmes. Therefore, the experts request that the curricula of the two programmes are designed in such a way that entrepreneurial skills are also taught, or alternatively to revise the mission statements accordingly.

Furthermore, as mentioned before, the experts recommend strengthening the practical skills of the students in the Bachelor's programme in Physics. They note that there are many theoretical courses, for instance, on algorithms as well as numerical and computational techniques. In contrast, Lab Work courses are often limited to 1 SKS per semester and only offered up to the fifth semester. As a consequence, the number of ECTS for practical laboratory work is below the 20–40 ECTS suggested by the SSC of the TC Physics. In addition, alumni and industry representatives confirm that the programme is very much focused on the theoretical dimension and somewhat neglects the applied side. The experts therefore suggest including more elements in the curriculum that allow students to acquire practical skills.

In the audit, the experts also inquire about the reasons for offering the specialisations Energy, Environment and Health in the Bachelor's programme in Physics. The programme coordinators explain that this is due to the research focus of the teaching staff. Thus, the research activities of the physics department are concentrated in the areas of materials science related to energy/environment, such as semiconductors as well as solar cells, and instrumentation, including medical physics. However, the programme coordinators stress that these fields also meet the needs of industry and the labour market. For example, surveys have shown that industry would like to see more courses on these topics, so the department has added several electives in recent years on medical instrumentation, bio-

materials and biosensors, semiconductors, wastewater treatment installation and nano-particle imaging. The experts welcome the fact that the topics offered in the programme are in line with the demands of industry and consider the choice of topics themselves to be suitable for a bachelor's degree in physics.

In this context, the experts ask why the specialisations in Environment and Health are not continued in the Master's programme in Physics, while energy is maintained, and Material and Instrumentation appear as new specialisations. The programme coordinators argue that several courses do address health and environment, the latter in the broader context of geophysics. However, they have decided to change the emphasis as they consider the areas like materials or instrumentation to be more relevant to science and industry. The experts accept this explanation and appreciate that all specialisations are still covered to some extent in the Master's programme.

The experts also inquire about the publication goals of the Master's programme in Physics. The teaching staff explain that every Master's student is required to submit at least one paper. In order to receive the title "cum laude" on graduation, a student must publish at least one paper in a Level 2 of National Accredited Journal. The fees for the submission of academic papers are covered by UNPAD. The experts consider these requirements to be appropriate for a Master's programme.

With regard to the Bachelor's programme in Geophysics, the experts wonder about the exact process and execution of the field trips. The programme coordinators explain that students will undertake a total of four field trips during their studies. One major field trip is to the ministry's laboratory in Central Java. Therefore, all laboratory activities in the field are organised by the Ministry. Other field trips are organised by the Ministry and funded mainly by industry partners. During the laboratory visits, the experts also inspect the tools used during the field trips. The experts conclude that the activities during the field trips and the equipment used are appropriate for the bachelor programme and support the achievement of the intended learning outcomes.

Finally, the experts ask the programme coordinators about the content and purpose of the module "Communication in Geosciences and Research Methodology" in the Geophysics Bachelor programme. The UNPAD members explain that the aim of the module is to teach students communication skills in the field of disaster aggregation, so that scientific facts can be communicated to the public in a way that does not cause panic. The experts believe that this is a valuable contribution to the curriculum in the Indonesian context.

Internship

The three programmes do not include a compulsory industrial internship. However, students on all bachelor programmes at UNPAD have the opportunity to replace some elective courses with activities from the Independent Campus Learning Programme (MBKM). MBKM is a programme organised by the Ministry of Higher Education, Research and Technology. As described in the self-assessment report, "the MBKM programme essentially provides students with the opportunity to study outside their study programme". This includes student mobility, internships in schools, research institutions and companies, humanitarian projects or independent projects. The activities can be converted into credits for students up to a maximum of 20 SKS. UNPAD has published formal guidelines on the process of recognition of activities undertaken under MBKM.

During the audit, the experts learn that an industrial internship usually lasts between four to five months and is completed in the sixth semester. Each company that has agreed to host a student from UNPAD has signed a Memorandum of Understanding with UNPAD, which guarantees a certain level of quality of the internship and the achievement of the programme's objectives. Each student is assigned a supervisor from both the company and the programme. The final grade is based on the internship report and its discussion, as well as the assessment of the student's performance by the company supervisor.

During the audit, industry representatives confirm that their companies have hosted students as interns. They report that they are satisfied with the performance of the students. The experts also find that the internship is well integrated into the curriculum and welcome the fact that there is a Memorandum of Understanding (MoU) between each company and UNPAD, which defines responsibilities and ensures that the internship contributes to the overall achievement of the intended learning outcomes of the respective study programme.

Student mobility

UNPAD offers all its students mobility activities both internationally and domestically. One way to achieve mobility is through the MBKM programme. MBKM offers a wide range of partner institutions in Indonesia and abroad. In order to participate in the mobility programme, students have to apply for a place at their chosen destination. As mentioned above, UNPAD has issued formal guidelines on the process of recognition of activities undertaken under MBKM. In general, student mobility activities can last from one to a maximum of six months. In addition, physics students have the opportunity to participate in the Sakura Science Programme organised by the Japan Science and Technology Agency. In the past, many students have participated in this programme and spent about three weeks in

Japan for research purposes. The general recognition regulations for student activities outside of MBKM are defined in the document “Guidelines for recognizing Independent Campus Learning Activities Universitas Padjajaran”.

According to the self-assessment report, in the last three years, 23 students from the Bachelor of Physics programme have studied abroad and 63 students have participated in domestic mobility. In the same period, 6 students in the Master's programme studied abroad. In the Geophysics bachelor's programme, no student has participated in mobility activities. UNPAD states in the self-assessment report that they are aware of the relatively low number of students participating in mobility and that they are currently working on expanding their network of partner institutions. With regard to the lack of mobility activities in the Geophysics programme in the last three years, UNPAD argues that during this period the department was still dealing with the consequences of the COVID pandemic. However, the university points out that the Department of Geophysics actively supports student mobility, for example by sending students abroad to international conferences.

In the audit, several students report that they have participated in mobility activities. They explain that, overall, UNPAD offers various opportunities for students to gain international exposure, whether through MBKM, the Sakura programme, other study or research cooperation programmes, or incoming lecturers and researchers from abroad. Students in the Geophysics programme, for example, report participating in a research project with an Australian research group visiting UNPAD. Overall, the Geophysics Department has active collaborations with Australian institutions. The experts also learn that the Department of Geophysics has collaborations with the Karlsruhe Institute of Technology and the University of Kaiserslautern-Landau. Students report that they are satisfied with the opportunities for international encounters and that there are various opportunities for international exposure if pursued by the student. The teachers of the respective programmes also actively support students who are interested in mobility or participation in international research projects. In addition, students confirm that they are not aware of any problems regarding the recognition of achievements.

The experts conclude that the university provides adequate exchange opportunities and support for students planning to go abroad. They recognise that the overall offer is rather moderate and that the number of students actually participating is relatively low, especially in the Master's programme in Physics and the Bachelor's programme in Geophysics. However, they appreciate the efforts of both departments to actively involve students in national and international research projects and to offer mobility programmes such as the Sakura programme. Thus, the experts consider that all students are given sufficient opportunities for international experience, which are well integrated into the structure of the

programmes. They also confirm that UNPAD has established appropriate and transparent rules for the recognition of qualifications.

In the audit, the experts inquire about the measures taken by UNPAD to improve the English language skills of the students. The teachers explain that, among other things, they conduct parts of some courses in English and require students to read academic papers in English. In addition, students are encouraged to improve their English by attending guest lectures. The experts appreciate the inclusion of English, e.g. through scientific papers in English. However, they point out that the module descriptions in the two Bachelor programmes do not contain this information. The module descriptions should therefore be revised to include information on the use of English. In addition, the experts consider that there is further room for improvement in students' English language skills. The experts believe that this would not only benefit students' careers, whether in industry or academia, but also increase the overall participation of students in mobility activities.

Periodic Review of the Curriculum

UNPAD reports that all its programmes are regularly reviewed. The bachelor's and master's programmes in physics are reviewed every four years, and the bachelor's programme in geophysics every five years. Curriculum evaluation is based on the achievement of programme outcomes as measured by student performance and stakeholder evaluation results (students, alumni, industry partners). The detailed process is described in Chapter 5 of this report. Students report that they are generally satisfied with the three programmes under review and that their suggestions are usually incorporated into the programmes. The experts also learn that UNPAD regularly invites guest lecturers from industry who give lectures on technical topics, but also share knowledge about the labour market and advise graduates on how to successfully enter it. The experts are pleased to hear that UNPAD takes stakeholder feedback into account when reviewing its programmes and that it maintains close links with industry. In general, the experts conclude that there is a systematic process for regular review and improvement of the programmes.

Criterion 1.4 Admission Requirements

Evidence:

- Self-Assessment Report
- Unpad website: https://www.Unpad.ac.id/en/
- Unpad admission website: http://smup.Unpad.ac.id/
- Discussions during the audit

Preliminary assessment and analysis of the experts:
According to the Self-Assessment Report, the admission procedures and policies for new students follow national regulations. The requirements, schedule, registration venue, and selection test are announced on UNPAD's webpage and thus accessible for all stakeholders.

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

1. National Selection Based on Achievement (SNBP), a national admission system, is based on the academic performance during the high school. 20 % of the students at UNPAD are admitted through this selection system.

2. National Selection Based on Tests (SNBT) is based on a national test, which is held every year for university candidates. It covers the following subjects: mathematics, Bahasa Indonesia, English, physics, chemistry, biology, economics, history, sociology, and geography. It accounts for 40 % of the admitted students at UNPAD.

3. Universitas Padjadjaran Entrance Selection (SMUP) is the selection procedure defined by the university itself. The selection is divided into 3 categories based on test selection, achievement selection, and selection for international students. For the test selection, students have to complete a written test (similar to SBMPTN) designed by UNPAD. Students who have achievements in the fields of science, sports, and arts can take part in the achievement selection. The last category is reserved for international students.

Applicants for the Master's programme in Physics are only selected through the Universitas Padjadjaran Entrance Selection. The admission procedure consists of interviews, academic ability tests and English proficiency tests. In both the academic and English tests, students must score a certain number of points. In the interview, students must demonstrate that they meet the standards set by the department to achieve the intended learning outcomes of the programme.

Applicants transferring from other programmes will be subject to a review process and will have their credits recognised if they meet the intended learning outcomes of the programme. The detailed guidelines are set out in the University's policy on the recognition of achievements acquired outside UNPAD and are published on the University's website.

According to the statistics, an average of 60 students start the Bachelor's programme in Physics and 60 of them successfully complete the programme. The maximum intake capacity of the programme is 85 students. In the Bachelor's programme in Geophysics, the average cohort size is 49 students, of whom 45 successfully complete the programme. The maximum intake capacity is 65 students. In the Master's programme in Physics, an average of

12 students enter the programme and 12 successfully complete their studies. The maximum intake capacity of the programme is 20 students.

The experts review the admission requirements and procedures and find that they are appropriate and support students in achieving the intended learning outcomes of the programme. They are also impressed by the very low dropout rates in the programmes and see this as confirmation that the admission requirements are adequate to enable students to complete the programmes successfully. They also note that the admission requirements are binding and transparent for all stakeholders. Finally, they welcome the fact that UNPAD has clear and binding rules on the recognition of external qualifications.

Criterion 1.5 Workload and Credits

Evidence:

- Self-Assessment Report
- UNPAD's "Regulation of the Student Workload"
- Study plans
- Module descriptions
- Student Handbook
- Discussions during the audit
- Student surveys
- Statistical data

Preliminary assessment and analysis of the experts:
The credit system at UNPAD follows the National Standards for Higher Education of Indonesia (SNPT), in which all programmes use a credit point system called SKS. According to this, 1 SKS is awarded for 170 minutes of workload per week divided into 50 minutes contact time/classes, 60 minutes structural assignments, and 60 minutes individual studying. This calculation of 1 SKS equalling 170 minutes of workload applies to all teaching forms including practicums, field trips, etc. Each semester spans over 16 weeks. The conversion from SKS into ECTS is explained in detail in UNPAD's decree on the "Regulation of the Student Workload". Accordingly, 1 SKS is equivalent to 1.81 ECTS (when 1 ECTS corresponds to 25 hours).

The Bachelor's programmes in Physics as well as Geophysics comprise each 144 credits, which equals 260 ECTS points. The experts note that the number of credits is evenly distributed over the entire duration of each Bachelor's programme which are eight semesters. On average, students take 19 - 21 SKS per semester.

The Master's programme Physics requires students to complete 67 SKS, which equal 121 ECTS points. The Master's programme is designed for the duration of four semesters.

The number of courses taken by students, and therefore their workload per semester, is controlled by the academic supervisor, the programme director and the faculty administration. All students are required to take a minimum of 18 SKS per semester. However, students may take a higher workload depending on their performance.

According to the data provided by UNPAD, the average length of studies in each study programme under review matches the expected study length i.e. eight semesters in the two Bachelor's programmes and four semesters in the Master's programme.

During the audit, students report that the workload is appropriate and in line with the workload indicated in the module descriptions and the credits awarded. However, the experts learn that there is no systematic monitoring of student workload. Students explain that they can complain if the workload becomes too heavy and that teachers usually respond quickly to student feedback; however, students are not regularly asked in a systematic way whether the workload actually corresponds to the officially defined workload. For this reason, the experts require UNPAD to establish a formal and systematic monitoring of students' workload, in particular their self-study time, and to compare it with the workload indicated in the module descriptions. This can be done, for example, through surveys in which students are asked how much time they actually spend on each module. In case of discrepancies between the expected and actual workload, UNPAD has to ensure that the credits awarded are in line with the total workload of the students.

In conclusion, the experts find that the three programmes under review use a sound credit system which takes into account both contact hours and self-study time. They also confirm that the calculation of credits awarded for each module and the conversion to ECTS are correct. Furthermore, they consider the workload estimates to be realistic and well-founded, which is confirmed by students' statements and statistics showing that, on average, students complete the programmes within the standard period of study. Nevertheless, the experts urge UNPAD to introduce a formal system to monitor the actual workload of students and, if necessary, to make adjustments to the credits awarded.

Criterion 1.6 Didactic and Teaching Methodology

Evidence:

- Self-Assessment Report
- Study plans
- Module descriptions

- Discussions during the audit

Preliminary assessment and analysis of the experts:
According to the self-assessment report, teaching methods are chosen on the basis of the characteristics of the course and the intended learning outcomes. The teaching staff at UNPAD use a semester learning plan to document the methods used for the modules. The suitability between the intended learning outcome of the course and the implementation of the teaching method is regularly evaluated.

The module descriptions of the three programmes show that a variety of teaching and learning methods are used, such as lectures, practical work, computer simulations, seminars and projects. In addition, students have the opportunity to undertake internships and other activities through the MBKM programme. The teaching and learning methods used consist of case-based study, project-based learning, problem-based learning, small group discussions, presentations, homework and independent study. Projects require students to work in small groups to solve a problem together, developing their communication, leadership and teamwork skills. Some courses include practical activities in the laboratory. The practical work consists of preparation for the practical (preparation of an experimental logbook), pre-tests, class discussions, carrying out the practical and preparation of reports. All relevant teaching resources are available on UNPAD's e-learning platform/Learning Management System (LMS). The module descriptions provide information on the form and method of teaching used in each module.

Students report that they are satisfied with the different forms and methods of teaching. They confirm that the teaching methods are student-centred and that the teachers are very committed to helping students when they have difficulties in learning the subject matter.

During the various review meetings, the experts also learn that students in the three programmes are involved in different research activities. For example, in the Master's programme, students are required to publish at least one academic paper. In the Bachelor's programme, students report that they have carried out their own research activities, for example through the Sakura programme, and/or participated in the research projects of UNPAD teachers or guest lecturers. The experts are impressed with the amount of academic work integrated into the three programmes, which confirms the research-oriented profiles of the programmes.

In summary, the expert group considers that the teaching methods and tools are appropriate to support students in achieving the intended learning outcomes. They confirm that the programmes include a variety of teaching and learning methods and practical elements adapted to the specific subject culture and study format. In particular, they appreciate the many opportunities for students to engage in scholarly work.

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

The university acknowledges the differences in terms of the objectives and learning outcomes across documents and provides revised Diploma Supplements which contain the current objectives and learning outcomes, which are also included in other documents. The experts therefore consider the requirement to be fulfilled.

Regarding the missing entrepreneurial skills or the inconsistent presentation of it across the vision, mission, the programme learning outcomes and the curricula, UNPAD states that they will revise the documents so that the acquisition of the entrepreneurial skills are consistent across all programmes and align with the curricula. The updated curriculum will be implemented in 2025. The experts welcome the plans of the HEI but since they have not been implemented they call for keeping the recommendation and requirement.

UNPAD also agrees with the experts on their suggestion to strengthen the practical skills of the students. They explain that they will increase the number of credits for practical modules ranging from 12-23 credits or equivalent to 21.72-41.63 ECTS. The plan is to implement the changes in 2025. The experts welcome the response from UNPAD. However, since the plan will only be implemented next year, the experts decide to maintain the recommendation for further assessment of the situation.

With regard to the missing monitoring of the students' workload, UNPAD states that they will include questions on the students' actual workload in the teaching evaluations. Additionally, UNPAD indicates to develop a system for evaluating and monitoring student workload by utilizing the existing academic information system at UNPAD. The experts appreciate the university's planned actions but since these have not been implemented yet, they call for maintaining the requirement.

Criterion predominantly fulfilled.

2. Exams: System, Concept and Organisation

Criterion 2 Exams: System, Concept and Organisation

Evidence:

- Self-Assessment Report
- Sample exams & theses
- Study plans
- "UNPAD's Examination Regulation"

- "Guidelines on Thesis Writing"
- Module descriptions
- Discussions during the audit

Preliminary assessment and analysis of the experts:
The examination system at UNPAD follows the Regulation of the Ministry of Research, Technology, and Higher Education of the Republic of Indonesia No. 3 of 2020 and the Rector's Regulation No. 46 of 2016 and No. 38 of 2021.

In the three study programmes under review, there are four main types of assessment: quizzes, assignments, mid-term and final exams. Mid-term and final exams can be in the form of written exams, oral exams, papers, presentations and scientific article resumes. Furthermore, the experts learn in the audit that elective courses are mostly assessed in the form of project work.

According to the self-assessment report, exams are designed in a way to assess whether the Intended Learning Outcomes have been achieved. As a quality control mechanism, exam questions must be approved by the head of the study program and the quality control group.

The exam schedule is coordinated by the head of the study programme. It is designed in a way that students do not have to take more than one exam per day. The mid-term exam is held after the 7th week of lectures, while the final exam is held in the 16th week. For some courses, an assessment is carried out at the end of each main topic to measure the achievement of the course LO. Students must attend at least 80% of the lectures in order to take the final exam.

Students who can't attend exams due to illness or other crucial reasons will receive the opportunity to re-take the exam. This and other compensation regulations for students with special needs are defined in UNPAD's Examination Regulations.

The final course grade is calculated from various assessment components. The module descriptions indicate the exact assessment methods and the calculation of the course grade. If cheating or plagiarism occurs, students will get a grade of E (failed). The total scores are converted into grades as shown in the table below:

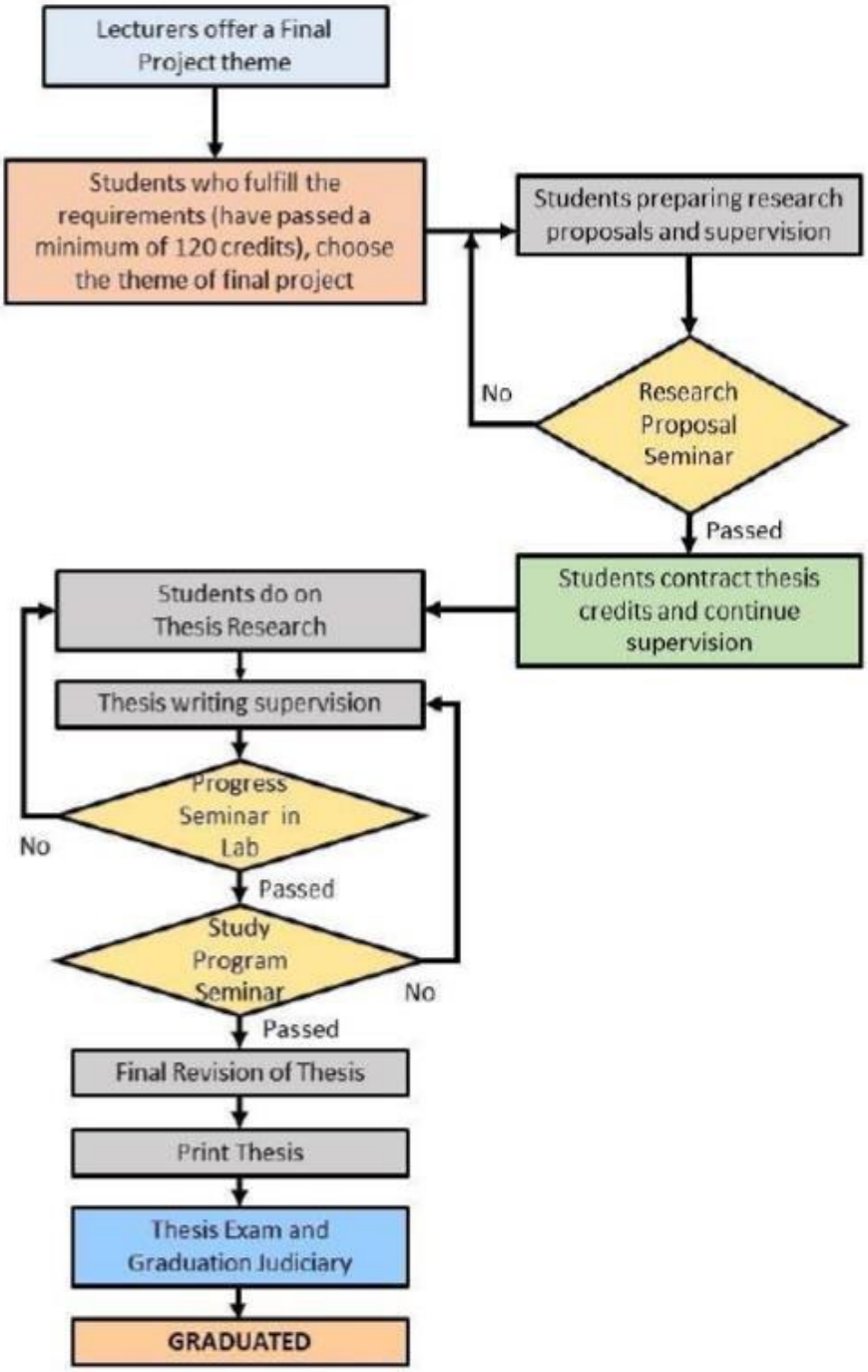
Final score	Grades in letter	Grades in number
NA ≥ 80	A	4
68 ≤ NA < 80	B	3
56 ≤ NA < 68	C	2
45 ≤ NA < 56	D	1
NA < 45	E	0
incomplete	T	

Students have the opportunity to improve their grades through remedial exams. If a student is declared to have failed the course, the student is required to re-sit the subject course in the following semester. The opportunity to re-sit courses is limited by the student's study period limit at the level concerned. Students can submit an appeal to their exam grade. The appeal procedure is published online on UNPAD's website.

The grade for the internship is combined by the grades given by the academic supervisor and the industrial supervisor. The assessment of the academic supervisor is based on the internship reports and interviews, while the supervisor from the enterprise assesses the student's performance during the internship.

To compete the Bachelor's programmes, students must carry out the final project/thesis, which is awarded 6 SKS (10.9 ECTS points) in addition to 2 SKS (3.6 ECTS points) for the course on "Scientific Writing Techniques". The execution of the final project spans usually one semester. The topics for the project are offered by the teachers. Once the student's research proposal has been accepted, they are allowed to begin with the implementation of the project including research and thesis writing. The experts learn in the audit that, throughout the project, each student receives guidance from two academic supervisors. Furthermore, they are told by the students that sometimes final projects are carried out through UNPAD's collaborations with Japanese universities.

The assessment of the final thesis in the Bachelor's programmes is carried out in two stages: the research progress seminar and the final project defense. In the research progress seminar, students have to present their final project in front of three lecturers. Two lecturers are from the same field whereas one examiner is from another discipline. In the final project defense, students are assessed regarding their abilities and understanding of the relationship between the final project and relevant courses. The final grade is made up of 60% from the research progress seminar and 40% from the final project defense. The detailed process of the thesis project is illustrated in the graphic below.



The preparation for the final project/thesis in the Master's programme in Physics begins in the first semester. Students choose a topic offered by the Physics Department and present their outline in the "Research Proposal Seminar". Once their proposal is approved, they can begin with the advanced research for their final project. Students are required to present their thesis again in the Research Progress Seminar in the third semester and in the final defence at the end of the fourth semester with three faculty members as examiners. Each student is supervised throughout their final project by two teachers.

The thesis procedure and the exact components of the assessment for both Bachelor's and Master's thesis are defined in the "Guidelines of Thesis Writing". All final theses are checked via similarity check software on plagiarism.

In the audit, students report to be satisfied with the examination system for all three study programmes. They confirm that they receive all relevant information such as examination dates and assessment criteria at the beginning of the semester. The examination policy, including the compensation policy, is made transparent to all concerned. When asked about the workload and the difficulty of the examinations, students say that both are appropriate and manageable.

The experts share the students' opinion: After reviewing the documentation and examinations, as well as samples of theses, they conclude that UNPAD has a sound examination system. They confirm that a variety of competence-based assessment forms are used in the three programmes under review, which are adequate to assess the achievement of course and programme learning outcomes. They also note positively that the assessment forms are reviewed regularly and that the whole assessment system is monitored to ensure fairness and appropriateness. In addition, the experts find the procedure for the final thesis convincing. The samples of final theses in all three programmes show that students are able to work scientifically and to carry out a project independently at the level of their degree. However, they note that there is no module description of the final project/thesis in the two Bachelor's programmes. As indicated in Chapter 4.1, UNPAD needs to establish module descriptions for the final project/thesis, including all the necessary information. Overall, the experts conclude that the level of the examinations is appropriate and corresponds to EQF level 6 in the two Bachelor's programmes and EQF level 7 in the Master's programme.

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

UNPAD submits module descriptions on the final thesis in the two Bachelor's programmes. The experts find that these include all relevant information and thereby consider the requirement to be fulfilled. However, they suggest that the module descriptions be clarified with regard to the position of the final project. Thus, the description states that it is possible to do the final project in the seventh semester, but it is actually supposed to be carried out in the eighth semester. The module descriptions should make this clear.

Criterion Fulfilled.

3. Resources

Criterion 3.1 Staff and Development

Evidence:

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

Preliminary assessment and analysis of the experts:
In the Bachelor's and Master's programmes in Physics, there are overall 18 lecturers involved in teaching: four full Professors, four Associate Professors, and ten Assistant Professors. 16 (of 18) members of the teaching staff in Physics have a PhD. In the Bachelor's programme in Geophysics, the teaching staff consists of 12 members: 1 full Professor, three Associate Professors, one Assistant Professor and seven (Senior) Lecturers. Out of the 12 teaching members, eight persons have a PhD, three are currently working on their doctoral project, and one member has a Master's degree. The teaching staff is supported in terms of administration and maintenance by eight administrative staff members and four laboratory staff in all three study programmes together. The teacher-student ratio is 1:13 for the Bachelor's programme in Physics, 1:17 in the Bachelor's programme in Geophysics, and 1:3 in the Master's programme in Physics.

According to the self-assessment report, in 2020 UNPAD has set up a new strategy to strengthen UNPAD's academic reputation by hiring employees with high quality and academic reputation. This programme, called "Pradja Brata" (Padjadjaran University Academic Recognition Programme), intends to recruit Adjunct Professors from universities abroad and highly qualified lecturers as well as postdoctoral researchers. Furthermore, external lecturers shall add external expertise to the study programmes. All external lecturers have to meet the qualification criteria set up by the Faculty of Mathematics and Natural Sciences referring to academic qualifications, level of expertise, and industrial experience.

The workload of teaching staff is divided into four SKS or 3 days per week for teaching including supervision and two days for research. A teacher can supervise up to six students per semester. On average, a teacher is teaching between three and four modules per semester. In the audit, the teachers add that they often do team teaching i.e. sharing the teaching parts for one module. They also confirm that that their workload is overall man-

ageable and that they deem the time reserved for research and further development sufficient. Each department at UNPAD regularly carries out surveys about the satisfaction of the teaching staff.

The research activities in each department follow the Master Plan of Research established by the Directorate of Research and Community Services of UNPAD. The experts note that the Physics and Geophysics Departments are involved in national and international collaborations involving universities and industry. As mentioned above, the two departments collaborate in particular on research projects with Japanese and Australian institutions, in which they also involve students. Details of individual staff publications and research projects are included in the Staff Handbook.

The experts assess the composition, professional orientation and qualifications of the teaching staff and conclude that they are suitable for successfully delivering the degree programmes at the intended level. They also note that the teachers are actively involved in research activities, as evidenced by the number of research projects and publications. They also appreciate the research network with various national and international institutions that the two departments have established. The students share the experts' satisfaction with the teaching staff. They indicate that they are satisfied with the didactic and technical skills of the teachers and appreciate that all teachers are generally open to criticism. They are therefore able to give feedback to the teacher at any time. In addition, students are able to give their feedback in the teaching surveys that are carried out each semester.

During the audit, the experts discuss with the programme coordinators and teachers the objectives and future endeavours of the two departments. They explain that they are currently working on expanding the departments and setting up a Master's programme in Geophysics and a PhD programme in Physics. However, in order to open these programmes, they have to meet certain criteria set by the Ministry, such as having a certain number of PhD holders in each department. Hence, for a Master’s degree there must be at least six teachers with a PhD degree, and for a Doctoral programme, there must be six teachers with a PhD, two of whom must be professors. The programme coordinators indicate that they are close to meeting the ministerial criteria and therefore believe that they will be able to start the Master's programme in Geophysics and the PhD programme in Physics next year (2025). The experts welcome these ambitions and ask whether the two departments indeed have sufficient resources for departmental expansion. The teaching staff state that they consider the current level of resources to be sufficient, but point out that there is always room for improvement and expansion of equipment. The experts also consider that the two departments have ideal conditions for the establishment of higher level study programmes. Nevertheless, they recommend that the overall research capacity and technical equipment for advanced research purposes in the Departments of Physics and Geophysics

be increased. In particular, they suggest increasing the computational resources for theoretical simulations, so that the resources can meet the increase in demand for simulations in materials science and geophysics that is expected when the planned Master's and PhD programmes start, and to provide an infrastructure for numerical simulations of complex systems at the current state of the art. Finally, the experts believe that the three study programmes currently being assessed would also benefit from these improvements, as the results of advanced research projects could be incorporated into teaching and opened up to student participation. Students would also be able to use new tools for their own studies and projects.

Staff Development

According to the self-assessment report, UNPAD has put in place several measures to promote staff development. The central unit responsible for staff development is the Teaching and Learning Innovation Center. The Center offers programmes for pedagogical training of teachers, including the production of teaching and e-learning materials. Staff also have the opportunity to improve their English language skills. All teachers at UNPAD are expected to have received didactic training and certification from the Center. New teachers are mentored by senior teachers, who are also required to assist as sit-in lecturers for at least one semester.

In terms of academic development, UNPAD supports its faculty to pursue doctoral studies in Indonesia and abroad. In line with the Master Plan of Research, faculty members are expected to conduct research projects, participate and present their research in conferences and symposia, and publish their research results in international journals. Teachers can also participate in international academic exchanges through the SAME programme (Scheme for Academic Mobility and Exchange) (see link: SAME Programme Guidelines), which is funded by UNPAD and the Directorate of Higher Education. UNPAD has a list of universities with which it has a Memorandum of Understanding (MoU) or Letter of Agreement (LoA). In the last five years, faculty from the Department of Physics and Geophysics have visited Massachusetts Institute of Technology (MIT), Tohoku University, Sophia University and Tokyo University of Agriculture Technology, among others.

UNPAD also has a monitoring system in place to control and review the performance of its teaching staff. The Heads of Department are responsible for the management of staff performance reviews. Each faculty member is required to report his or her activities for the semester in his or her staff account, which consists of teaching, research, community service and other activities. The review also takes into account student feedback through electronic surveys and checks whether the teacher's skills are in line with the level and objectives of the programme. Teachers are awarded points based on their performance, which

acts as a further incentive. If a teacher does not reach a certain level, he or she will receive a warning for the next semester.

In the audit, the teaching staff states that they regularly participate in the services offered by UNPAD. Junior teachers, in particular, receive intensive didactic training. The experts are pleased to hear that teachers are well supported. They also find that the mechanisms in place to promote staff development are adequate and ensure that the study programmes under review remain at a high level.

Criterion 3.2 Student Support and Student Services

Evidence:

- Self-Assessment Report
- Discussions during the Audit

Preliminary assessment and analysis of the experts:
UNPAD has an integrated academic and information system called “SIAT” through which students have access to lectures, course materials, student-lecturer interactions and administrative processes. Each student is assigned an academic advisor, a lecturer who is responsible for the student's activities from the beginning to the end of their studies. Students confirm during the expert group discussion that they all have an academic advisor, that they meet regularly and that they can always contact their advisor personally and ask for help or advice.

In addition, students can rely on peer tutors at the beginning of their studies, as well as several dedicated support units, such as the Integrated Service Centre, the library, and career and counselling services. For example, UNPAD's Centre of Psychological Innovation offers psychological counselling to students. In addition, UNPAD provides health services, a sports centre and various other structures and units for student participation.

The experts consider that there are sufficient resources to provide individual guidance, counselling and support to all students. The support system helps students to adapt to the university environment, to achieve the intended learning outcomes and to complete their studies successfully. Students report being well informed about and satisfied with the services available to them.

Criterion 3.3 Funds and equipment

Evidence:

- Self-Assessment Report
- Discussions during the audit

Preliminary assessment and analysis of the experts:
According to the self-assessment report, the funding of the study programmes is managed on faculty level. About one third of the funding of the Faculty of Mathematics and Natural Sciences stems from the Indonesian Government. The remaining income originates from tuition fees and other endeavours such as research grants, tridharma cooperation, and services offered by UNPAD. UNPAD's current strategy is to gain more financial independence by increasing the university's revenue through other means (e.g. workshops, consultancy, learning modules, grants, and scholarship funds). Every year a budget plan is established for each study programme dividing funds for operational and developing activities. Operational activities consist of teaching, laboratory work, research, community service, and other routine activities. Meanwhile, developing activities involve implementation of international programs such as international accreditation, double degree, student exchange, joint research, joint supervision, and other promotional activities to get domestic and international students. In view of the data and explanations provided by the university, the experts are convinced that there is secure funding and reliable financial planning for the three programmes for the coming accreditation period.

During the on-site visit, the expert group visits various classrooms, laboratories and other facilities such as the university library. The experts learn that each laboratory has a capacity of around 40-50 students. All instruments are validated and calibrated on a regular basis. The experts are also informed about the collaborations that the Department of Physics and Geophysics has with other institutions, giving them access to a wider range of laboratories and equipment for both research and teaching. For example, the Department collaborates with the Geological Research Centre, the National Institute of Aeronautics and Space and the National Nuclear Energy Agency.

In the audit, the students report that they are satisfied with the facilities and equipment at UNPAD, noting that all the necessary tools and software are available. The only wish they express is for the labs to be open longer, as they are currently only open until 16:00, which the experts believe is a legitimate request. Teachers are also satisfied with the labs and facilities, stating that if they need certain tools for research projects that UNPAD does not have, they can either submit a request to the Dean to purchase them or alternatively borrow them from another institution. They also inform the experts that UNPAD conducts an annual survey of faculty and student satisfaction with the equipment and facilities.

Industry partners and alumni agree with the teachers' and students' statements that the available equipment is sufficient for the three study programmes under review; however, they also share the opinion of the experts described above that UNPAD should pursue more advanced and innovative research in order to become more internationally competitive and produce graduates who can compete in the international labour market. The basis for

this is increased investment in laboratories and tools that allow for more advanced research. For example, alumni suggest the inclusion of computational resources for theoretical simulations and, for the Geophysics programme, the use of specialised software. Currently, students on the Geophysics programme are only taught standard geophysical interpretation software, such as DC resistivity methods, but not advanced software such as seismic interpretation software used in the petroleum industry.

The experts fully agree with the alumni and industry representatives: They also find that the infrastructure is well maintained and adequate to run the three programmes under review and to achieve the respective programme objectives. However, if there is to be an increase in research and the establishment of the Master's programme in Geophysics and the PhD programme in Physics, there should also be an expansion of advanced equipment. For example, as mentioned above, the experts suggest increasing the computing resources for theoretical simulations in all programmes. They also agree with the alumni and industry representatives that software is a valuable addition to the Bachelor's degree in Geophysics and therefore recommend the introduction of professional industrial software (such as PERTEL), especially for the interpretation of seismic data used in petroleum exploration. In addition, the experts suggest the introduction of advanced magnetotelluric equipment (for exploration) in the Geophysics Department. They consider the basic equipment currently available in the Bachelor's programme to be sufficient, but encourage the department to acquire advanced equipment to raise the level of research in the geophysics department. At the same time, they are convinced that this addition will make a significant contribution to the future Master's programme in Geophysics.

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

UNPAD agrees with the experts that the Department of Physics and Geophysics requires more research equipment. The university has proposed a list of new equipment to the university management. The list has been submitted to the experts. The experts welcome the department’s application for further equipment and hopes for a quick acquisition of it. Since the equipment has not been yet obtained though, the recommendation is maintained.

Criterion fulfilled.

4. Transparency and Documentation

Criterion 4.1 Module Descriptions

Evidence:

- Self-Assessment Report
- Module descriptions
- Websites of all study programmes

Preliminary assessment and analysis of the experts:

Having studied the module descriptions of all three programmes, the experts confirm that they contain most of the necessary information (course name, course code, total student workload, ECTS points awarded, grading scale, intended learning outcomes, content, recommended reading, possible prerequisites, examination methods and assessment criteria). The module descriptions also include the name of the teacher(s), but do not indicate who exactly is responsible for the module. The module descriptions must therefore make it clear who is in charge of the module. In addition, as mentioned in Chapter 1.3, the experts learn that the use of English is more widespread in the courses than is indicated in the module descriptions. For this reason, the module descriptions should be revised to give more precise information about where and when English is used. Finally, as described in Chapter 3, the module handbook lacks a description of the final thesis/project in the Bachelor's programmes in Physics and Geophysics.

The students confirm during the discussions that information about the courses are always available online and that details concerning examinations and contents are provided at the beginning of each course by the teaching staff.

Criterion 4.2 Diploma and Diploma Supplement

Evidence:

- Exemplary diploma certificate per study programme
- Exemplary diploma supplement per study programme
- Exemplary transcript of records per study programme

Preliminary assessment and analysis of the experts:

The experts confirm that all graduates are awarded a Diploma and a Diploma Supplement in English after graduation. The Diploma consists of a Diploma Certificate and a Transcript of Records. The Diploma Supplement contains all required information about the degree programmes. The Transcript of Records lists all the courses that the graduate

has completed, the achieved credits, grades, and cumulative GPA.

Criterion 4.3 Relevant Rules

Evidence:

- Self-Assessment Report
- All relevant regulations as published on the university's webpage
- Audit Discussions

Preliminary assessment and analysis of the experts:
The auditors confirm that the rights and obligations of both UNPAD and the students are clearly defined and binding. All rules and regulations are published on the university's website and students receive course materials at the beginning of each semester. In addition, all relevant information about the programmes is available on the programme homepages.

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

UNPAD provide revised extracts from the module handbooks, which detail the use of English in specific modules. As mentioned above, UNPAD also provides module descriptions for the final thesis in the Bachelor's programmes. The experts note, however, that the module descriptions have not been revised with regard to the responsible person. The current module descriptions still refer only to the teachers and not to the person responsible for the module. They therefore ask UNPAD to include this information in the module descriptions. As UNPAD has also only submitted extracts from the module handbooks, the experts request UNPAD to submit the complete module handbooks with all module descriptions for all programmes.

Criterion partly fulfilled.

5. Quality management: quality assessment and development

Criterion 5 Quality management: quality assessment and development

Evidence:

- Self-Assessment Report
- Decrees and manuals on Quality Assurance
- Evaluation Guidelines

- Samples of surveys for students, teachers and industry partners
- Reports of the survey results
- Discussions during the audit

Preliminary assessment and analysis of the experts:
The experts discuss the quality management system at UNPAD with the programme coordinators and the students. They learn that there is a continuous process in order to improve the quality of the degree programmes and it is carried out through internal as well as external evaluation. The quality assurance system at UNPAD is conducted by the Office of Quality Assurance (SPM), which is supported by the Quality Assurance Unit (UPM) at faculty level.

The internal evaluation of the quality of the programmes is mainly done through student and alumni surveys (annual tracer study conducted by the university). Students give their feedback on the courses by filling in online questionnaires. It is compulsory for students to give feedback on their courses, otherwise they will not be able to access their account on the SIAT digital platform. There are several forms and occasions for student evaluation in the study programmes under review: Twice a semester (in the middle and at the end), students are asked to fill in a questionnaire about the courses and programmes. In addition, at the end of each teaching session, students have the opportunity to submit their feedback on the session through the Integrated Academic Information System (SIAT), together with their attendance record. The results of the evaluations are analysed by the programme director, members of the quality control group and teachers, and are used to further improve the programmes. The teachers then discuss the results of the feedback analysis with the students.

Students confirm in the audit that surveys are carried out regularly and that the results are actually communicated to them shortly afterwards. They state that their feedback is taken into account by the teaching staff and that improvements are usually implemented quickly. Students also appreciate the friendly communication between teachers and students, which allows them to share their feedback with the teacher at any time.

UNPAD regularly conducts an Alumni Tracer Study. By participating in this survey, alumni can comment on their educational experience at UNPAD, the waiting period for employment after graduation, their professional career, and make suggestions on how to improve the programme. In addition, industry partners are regularly asked to provide feedback to UNPAD on the employability and skills acquired by UNPAD graduates. During the audit, alumni and industry representatives confirmed that they are regularly consulted and that their feedback is usually implemented in the study programmes.

The external quality assessment of the programmes is carried out by the National Accreditation Board (BAN-PT) and LAMSAMA (Indonesian Accreditation Agency for Higher Education in Health).

In summary, the expert group confirms that the quality management system at UNPAD is inclusive of all stakeholders and is capable of identifying weaknesses and continuously improving programmes.

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

Criterion fulfilled.

D Additional Documents

No additional documents needed.

E Comment of the Higher Education Institution (15.08.2024)

1. The Degree Programme: Concept, Content & Implementation

“Criterion 1.1 Objectives and learning outcomes of a degree programme

Regarding the programme learning outcomes in the self-assessment report differ from those in the Diploma Supplements, we can clarify that the diploma supplement provided in the SAR (Criterion 4.2) is meant for students who followed the 2016 curriculum for both Bachelor’s programme in Physics and Geophysics. We have prepared a diploma supplement containing the program's learning outcomes (LO) and objectives, consistent with other documents such as the academic guidelines, website, and SAR, which will be issued to students graduating in 2024 under the 2020 curriculum. The updated Bachelor’s programme in Physics diploma supplement can be accessed in the link Ba Physics diploma supplement. Regarding Bachelor’s programme in Geophysics, since the curriculum change took place in 2021, there have not yet been any graduates, and there is no current Diploma Supplement available.

Considering the insufficient allocation of time and the workload for practical sessions, we agree with the comments from ASIIN experts to enhance the practical skills of Bachelor’s programme in Physics students by increasing the number of credits for practical modules. We will separate the previously integrated practical sessions within courses into independent modules. The number of credits will be aligned with SSC criteria, ranging from 12-23 credits or equivalent to 21.72-41.63 ECTS. We are currently discussing these changes as part of the curriculum revision, with the aim to implement them in the 2025 academic year. The draft curriculum, reflecting the increased practical credits, can be found in following link Ba Physics Draft Curriculum.

Regarding the experts' suggestions to one of the programme missions “Realizing education that produces graduates who are adaptive to the development of science and technology and have an entrepreneurial spirit", we will review the visions, mission, goals, and strategies as well as the curriculum for Bachelor’s programme and Master’s programme in Physics, especially in the term of entrepreneurial spirit. We will ensure that the visions, missions, goals, and strategies are consistent across all programs and aligns with the curriculum. The updated curriculum will be implemented in 2025. On the other hand, the objectives and learning outcomes of the UPG will be adjusted to include entrepreneurial skills. This adjust-

ment aims to provide a more transparent and accurate overview of the graduates' competencies, making it easier for potential employers and other stakeholders to understand the graduates' potential in this area.

Criterion 1.3 Curriculum

We agree with the ASIIN experts' suggestion to add an entrepreneurial course. To enhance entrepreneurial skills, a project management course will also be included as a compulsory subject at Bachelor's programme in Physics. Additionally, to provide a deeper understanding of entrepreneurial, Bachelor's programme in Physics will facilitate entrepreneur internships at O'Orange or Yellow Earth, which are business incubation institutions at the university level.

Regarding the recommendation to strengthen the practical skill of students, Bachelor's programme in Physics will increase the types of practical courses to ensure that the total number of credits meets SCC criteria, which require 12-23 credits or equivalent to 21.72-41.63 ECTS.

Concerning the incomplete information about the language of instruction that is not mentioned in the module handbook, we have now included a detailed explanation in the handbook (link English module handbook). Several courses taught in English are listed, such as Introduction to Solid State Physics (Ba in physics), Superconductor Material Preparation (Ba in physics), and Magnetic and Superconductivity Physics (Ma in physics). In the Geophysics program, the courses delivered in English include Introduction to Earth and Planetary Sciences and Introduction to Computational Fluid Dynamics. Additionally, we plan to offer the Scientific Technical Writing course entirely in English to further enhance students' English proficiency.

Criterion 1.5 Workload and credits

Regarding the systematic monitoring of students' workload, we will conduct regular monitoring of student workload through a questionnaire. At this moment, the questionnaire has been conducted periodically twice each semester to evaluate the teaching-learning process. However, it has not yet included an assessment of student workload. Therefore, the questionnaire will be revised to include monitoring and evaluation of student workload. The results from this questionnaire will be used to improve the teaching and learning system for the rest of the course in a semester and as a basis for adjustments to the number of credits during the curriculum revision. Additionally, we will develop a system for evaluating and monitoring student workload by utilizing the existing academic information system at Unpad.

2. Exams: System, Concept & Organisation

Concerning to the module description for the final project/thesis, we have added the module handbook for the final project for Bachelor's programme in Physics and Geophysics (link of final project module). We have also updated the module handbook to include the contact persons (PIC) for each course.

3 Resources

Criterion 3.1 Staff and Staff Development

For research equipment, we agree with the ASIIN experts' recommendation that the Department of Physics and Geophysics requires more research equipment. Currently, advanced research equipment is utilized through facilities provided by partners who have collaborations with Unpad, both domestically and internationally. These research partnerships enable students, particularly those working on their final projects for Bachelor's programmes in Physics and Geophysics as well as Master's programme in Physics to access and use the equipment. We attached a list of research equipment from partners that is available for students to be accessed (Appendix 3.1).

Additional equipment to support the teaching and learning process, including new software for bridging the gap between students' basic skills and industry expectations, has been proposed to the university. We expect that these equipment and software will be acquired within the next 1-3 years. A list of equipment currently proposed to the university by the Physics and Geophysics Department is included in Appendix 3.2.

Criterion 3.3 Funds and equipment

Based on student input about laboratory hours, we can allow students to work on their final project research beyond 4:00 PM (usually up to 6:00 PM). Additionally, they may obtain extra time by submitting a request to the faculty through the head of the study program, following the SOP (link of SOP Lab Hour).

4. Transparency and Documentation

Criterion 4.1 Module descriptions

Addressing the ASIIN expert team's feedback on the module handbook, we have updated the handbook to include details about the use of English in various courses within Bachelor's programmes in Physics and Geophysics and Master's programme in Physics. Additionally, we have also provided the module handbook for the final project."

F Summary: Expert recommendations (06.09.2024)

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

Degree Programme	ASIIN Seal	Maximum duration of accreditation
Ba Physics	With requirements for one year	30.09.2030
Ba Geophysics	With requirements for one year	30.09.2030
Ma Physics	With requirements for one year	30.09.2030

Requirements
For all programmes

A 1. (ASIIN 1.5) Establish a formal mechanism to systematically monitor the actual workload of students.

A 2. (ASIIN 4.1) Revise the module descriptions to reflect the actual people responsible for the modules.

Ba & Ma Physics

A 3. (ASIIN 1.1, 1.3) (Re-)design the programme so that students have more opportunities to acquire entrepreneurial skills.

Recommendations
For all programmes

E 1. (ASIIN 1.3) It is recommended that students' English language skills are strengthened, e.g. by offering technical modules in English.

E 2. (ASIIN 3.1, 3.3) It is recommended to increase the research capacity and to pursue the development plan of higher level study programmes. In this context, it is also recommended to increase resources for advanced research, including computational resources for theoretical simulations.

Ba Geophysics

E 3. (ASIIN 1.1) It is recommended to include the achievement of entrepreneurial skills in the learning outcomes of the programme.

E 4. (ASIIN 3.3) It is recommended that professional industry software, such as PERTEL, be implemented, particularly for the interpretation of seismic data used in petroleum exploration.

E 5. (ASIIN 3.3) It is recommended to introduce equipment for advanced research, such as advanced magnetotelluric equipment.

Ba Physics

E 6. (ASIIN 1.1, 1.3) It is recommended to strengthen the practical skills of the students.

G Comment of the Technical Committees

Technical Committee 11 – Geosciences (13.09.2024)

Assessment and analysis for the award of the ASIIN seal:

The committee discusses the procedure and follows the vote of the experts without any changes.

The Technical Committee 11 – Geosciences recommends the award of the seals as follows:

Degree Programme	ASIIN Seal	Maximum duration of accreditation
Ba Geophysics	With requirements for one year	30.09.2030

Technical Committee 13 – Physics (13.09.2024)

Assessment and analysis for the award of the ASIIN seal:

The Technical Committee discusses the procedure and follows the experts' assessment. The recommendation E6 is clarified:

“E 6. (ASIIN 1.1, 1.3) It is recommended to strengthen the practical skills of the students in order to enhance their employability.”

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

Degree Programme	ASIIN Seal	Maximum duration of accreditation
Ba Physics	With requirements for one year	30.09.2030
Ba Geophysics	With requirements for one year	30.09.2030
Ma Physics	With requirements for one year	30.09.2030

H Decision of the Accreditation Commission (24.09.2024)

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

The commission discusses the accreditation procedure and follows the assessment of the experts. They also support the suggestion for a new wording of Recommendation E6 as proposed by TC 13.

In addition, the Commission proposes that the programme learning outcome in the Bachelor of Geophysics "Good comprehension, respect and execution of the moral, social, environmental and religious obligations associated with geophysical exploration and study" should be reformulated as "having religious respect", as in the other two programmes.

The Accreditation Commission decides to award the following seals:

Degree Programme	**ASIIN Seal**	**Maximum duration of accreditation**
Ba Physics	With requirements for one year	30.09.2030
Ba Geophysics	With requirements for one year	30.09.2030
Ma Physics	With requirements for one year	30.09.2030

Requirements
For all programmes

A 1. (ASIIN 1.5) Establish a formal mechanism to systematically monitor the actual workload of students.

A 2. (ASIIN 4.1) Revise the module descriptions to reflect the actual people responsible for the modules.

Ba & Ma Physics

A 3. (ASIIN 1.1, 1.3) (Re-)design the programme so that students have more opportunities to acquire entrepreneurial skills.

Recommendations
For all programmes

E 1. (ASIIN 1.3) It is recommended that students' English language skills are strengthened, e.g. by offering technical modules in English.

E 2. (ASIIN 3.1, 3.3) It is recommended to increase the research capacity and to pursue the development plan of higher level study programmes. In this context, it is also recommended to increase resources for advanced research, including computational resources for theoretical simulations.

Ba Geophysics

E 3. (ASIIN 1.1) It is recommended to include the achievement of entrepreneurial skills in the learning outcomes of the programme.

E 4. (ASIIN 3.3) It is recommended that professional industry software, such as PERTEL, be implemented, particularly for the interpretation of seismic data used in petroleum exploration.

E 5. (ASIIN 3.3) It is recommended to introduce equipment for advanced research, such as advanced magnetotelluric equipment.

Ba Physics

E 6. (ASIIN 1.1, 1.3) It is recommended to strengthen the practical skills of the students in order to enhance their employability.

Appendix: Programme Learning Outcomes and Curricula

According to the Academic Guidelines, the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the Bachelor degree programme Physics:

1. "Graduates are able to identify and explain the foundations of physics which include classical and modern, computational and experimental and applied physics.
2. Graduates are able to solve simple and practical problems by applying theoretical physics, computing and experimental methods in the fields of energy, environment and health.
3. Graduates are able to analyze simple and practical problems in one of the fields of theoretical physics, computing or experiments for energy, environmental and health physics.
4. Graduates are able to work on clearly defined scientific tasks and are able to explain the results orally and in writing, in the fields of theoretical physics, applied physics, computing or experiments, as well as their application in the fields of energy, environment and health.
5. Graduates are able to use the principles of lifelong learning principles to improve knowledge and current issues about physical sciences in the fields of energy, environment and health.
6. Graduates are able to demonstrate religious attitudes and tolerance
7. Graduates are able to show a responsible attitude and are committed to law enforcement, ethics, norms for community life and environmental sustainability."

The following **curriculum** is presented:

SEMESTER 1

No	Course Group	Course Code	Courses	Load (SKS)
1	General Basic Course (MKDU)	UNX01-001	Religion	2
2		UNX01-004	Indonesian	2
3		UNX01-006	Creativity and Entrepreneurship (OKK)	3
4		UNX01-007	Pancasila	2
5		UNX01-008	Civic Education	2
6	Compulsory Courses (MKW)	D10C20.1001	Basic Physics I	4
7		D10C20.1002	Basic Physics Practicum I	1
8		D10C20.1003	Mathematical Physics I	2
9		D10C20.1004	Algorithms and Programming	2
10		D10C20.1005	Algorithm and Programming Practicum	1
SUM				**21**

SEMESTER 2

No	Course Group	Course Code	Courses	Load (SKS)
1	Compulsory Courses (MKW)	D10C20.2001	Basic Physics II	4
2		D10C20.2002	Basic Physics Practicum II	1
3		D10C20.2003	Mathematical Physics II	3
4		D10C20.2004	Modern Physics	2
5		D10C20.2005	Numerical Computing	2
6		D10C20.2006	Numerical Computing Practicum	1
7		D10C20.2007	Mechanics	4
8		D10C20.2008	Thermodynamics	3
SUM				**20**

SEMESTER 3

No	Course Group	Course Code	Courses	Load (SKS)
1	Compulsory Courses (MKW)	D10C20.3001	Electronics	4
2		D10C20.3002	Electronics Practicum	2
3		D10C20.3003	Magnetic Electricity	4
4		D10C20.3005	Physics Experiments	1
5		D10C20.3006	Mathematical Physics III	3
6		D10C20.3007	Scientific Research Methods	2
7		D10C20.3008	Wave	4
SUM				20

SEMESTER 4

No	Course Group	Course Code	Courses	Load (SKS)
1	General Basic Course (MKDU)	UNX10.050020	Community Service Program (KKN)	3
2	Compulsory Courses (MKW)	D10C20.4003	Quantum Physics	4
3		D10C20.4004	Introduction to nuclear physics	3
4		D10C20.4005	Advanced Physics Experiments	1
5		D10C20.4007	Computational Physics	2
7	Elective Courses (MKP)	D10C20. XXXX	MKP / MKKM (6 to 10 credits)	6
SUM				19

SEMESTER 5

No	Course Group	Course Code	Courses	Load (SKS)
1	Compulsory Courses (MKW)	D10C20.5001	Physics Expertise Practicum	1
2		D10C20.5002	Introduction to Solid Matter Physics	4
3		D10C20.5003	Optics	2
4		D10C20.5004	Statistical Physics	3
5	Elective Courses (MKP)	D10C20. XXXX	MKP/MKKM	10
SUM				20

SEMESTER 6

No	Course Group	Course Code	Courses	Load (SKS)
1	Elective Courses (MKP)	D10C20. XXXX	MKKM or MKP	20
SUM				20

SEMESTER 7

No	Course Group	Course Code	Courses	Load (SKS)
1	Elective Courses (MKP)	D10C20. XXXX	MKKM or MKP	20
SUM				20

SEMESTER 8

No	Course Group	Course Code	Courses	Load (SKS)
1	Compulsory Courses (MKW)		Thesis / Final Project	6
SUM				6

According to the Academic Guidelines, the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the Bachelor degree programme Geophysics:

1. "Apply principles of physics, mathematics, geology and other related sciences to analyze and interpret geophysical data, as well as to identify and analyze the physical properties of rocks and minerals (O-1).
2. Conduct survey design and data acquisition using various geophysical methods with mapping, GIS and instrumentational support and apply computational methods for processing and modeling geophysical data (O-2).
3. Communicate effectively in scientific written and oral presentations, work collaboratively in multidisciplinary teams and society in general, with admiration to ethical and environmental considerations, and utilize geophysical data and modeling to solve environmental problems (O-3)."

The following **curriculum** is presented:

SEMESTER I

NO	CODE	COURSES	CREDIT
1	D10F.1201	Physical Geology	3(2-3)
2	D10F.1202	Physics I	4(3-3)
3	D10F.1203	Calculus	3(3-0)
4	UNX01-001	Religion	2(2-0)
5	UNX01-004	Indonesian	2(2-0)
6	UNX01-006	Exercise Creativity and Entrepreneurship	3(3-0)
7	UNX01-007	Pancasila	2(2-0)
8	UNX01-008	Civic education	2(2-0)
		TOTAL	21

SEMESTER II

NO	CODE	COURSES	CREDIT
1	D10F.2201	Physics II	4(3-3)
2	D10F.2202	Geomathematics	6(6-0)
3	D10F.2203	Differential Equations	4(4-0)
4	D10F.2204	Structural Geology and Sedimentation	4(4-0)
5	D10F.2205	Practical Geology of Structure and Sedimentation	2(0-6)
6	D10F.2206	Introduction to Earth and Planetary Sciences	2(2-0)
		TOTAL	22

SEMESTER III

NO	CODE	COURSES	CREDIT

1	D10F.3201	Geographical and Mapping Information Systems	2(2-0)
2	D10F.3202	Practicum of Geographic Information Systems and Mapping	2(0-6)
3	D10F.3206	Fundamental Geophysics and Exploration I	4(4-0)
4	D10F.3207	Fundamental and Exploration Geophysics Practicum I	2(0-6)
5	D10F.4204	Instrumentation	3(2-3)
6	D10F.4202	Geochemistry	4(4-0)
7	D10F.3208	Geodynamics	3(3-0)
		TOTAL	20

SEMESTER IV

NO	CODE	COURSES	CREDIT
1	D10F.3204	Geostatistics	3(3-0)
2	D10F.3205	Numerical Methods	3(2-3)
3	D10F.4203	Signal Processing and Geophysical Inversion	4(3-3)
4	D10F.4205	Fundamental Geophysics and Exploration II	6(6-0)
5	D10F.4206	Fundamental Geophysics and Exploration Practicum II	2(0-6)
6	D10F.4207	Volcanology and Geothermal Energy	3(3-0)
		TOTAL	21

SEMESTER V

NO	CODE	COURSES	CREDIT
1	D10F.5201	Geology and Geophysics Field Lecture	6(0-18)
2	D10F.5202	Environmental Geophysics and Disasters	4(4-0)
3	D10F.5203	Earth Communications	2(2-0)
4	D10F.5204	Research methodology	2(2-0)
5	D10F.5205	Computational Geophysics	3(3-0)
		Elective Course	3
		TOTAL	20

SEMESTER VI

NO	CODE	COURSES	CREDIT
1	D10F.6201	Geophysics Project	6(0-18)
2		Elective Course	14
		TOTAL	20

SEMESTER VII

NO	CODE	COURSES	CREDIT
1	D10F.7201	Thesis	6(6-0)
2		Elective Course	14
		TOTAL	20

According to the Academic Guidelines, the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the Master degree programme Physics:

1. "To be able to formulate and analyze problems in instrumentation, materials, energy, and geophysics (LO1).
2. To be able to apply physics theories, computations, and experimental methods to solve complex problems in instrumentation, materials, energy, and geophysics (LO2).
3. To be able to communicate their works and scientific ideas orally and in writing. (LO3)
4. To be able to collaborate, take responsibility in teamwork, and display academic leadership (LO4).
5. To be able to use long-life learning principles to enhance their knowledge and actual issues in physics in the fields of instrumentation, materials, energy, and geophysics (LO5).
6. To be able to demonstrate a sense of responsibility and commitment to upholding the law, ethics, social norms, and environmental sustainability (LO6)."

The following **curriculum** is presented:

Semester	Code	Courses	Type	Credit
1	D20H3101	Electrodynamics	A	4
	D20H3102	Computational Science	A	2
	D20H3103	Scientific Writing	B	2
	D20H3104	Research Proposal Seminar	B	2
	D20H41XX	Elective Course	C	2
	Total Credit 1st Semester			**12**
2	D20H3201	Quantum Mechanics*	A	4
	D20H3202	Crystallography and Diffraction Techniques*	A	2
	D20H3203	Transport Phenomena*	A	4
	D20H3204	Statistical Mechanics*	A	2
	D20H3206	Sensor Technology and Instrumentation*	A	2
	D20H42XX	Elective Course	C	2
	D20H42XX	Elective Course	C	2
	D20H42XX	Elective Course	C	2
	*at least 6 credits (2 courses) from 14 credits (5 courses)			
	Total Credit 2nd Semester			**12**
3	D20H3301	Research Progress Seminar	B	2
	D20H41XX	Elective Course	C	2
	Total Credit 3rd Semester			**4**
4	D20H3302	Thesis	B	8
	Total Credit 4th Semester			**8**
	Compulsory courses		A	**12**
	Supporting courses for final project and publication, and thesis		B	**14**
	Elective courses		C	**10**
	Total Credit for Master Program in Physics			**36**

Compulsory/Supporting Courses		Learning Outcomes					
Courses	Credit	LO1	LO2	LO3	LO4	LO5	LO6
Electrodynamics	4	√	√				
Computational Science	2	√	√				
Scientific Writing	2	√	√	√			√
Research Proposal Seminar	2	√	√	√	√	√	√
Quantum Mechanics	4	√	√				
Crystallography and Diffraction Techniques	2	√	√				
Transport Phenomena	4	√	√				
Statistical Mechanics	2	√	√				
Sensor Technology and Instrumentation	2	√	√				
Research Progress Seminar	2	√	√	√	√	√	√
Thesis	8	√	√	√	√	√	√
Elective Courses							
Courses	Credit	LO1	LO2	LO3	LO4	LO5	LO6
Advanced Materials for Environmental Applications	2		√		√	√	
Magnetism and Superconductivity	2		√		√	√	
Computational Materials Science	2		√		√	√	
Battery Technology	2		√		√	√	
Information Physics	2		√		√	√	
Artificial Intelligence	2		√		√	√	
Computational Earth Science	2		√		√	√	
Geophysics in Environmental Engineering	2		√		√	√	
Functional Polymer	2		√		√	√	
Nanotechnology	2		√		√	√	
Carbon Technology	2		√		√	√	
Supercapacitor	2		√		√	√	
Advanced Materials for Energy and Medical Applications	2		√		√	√	
Control System and Control Instrumentation	2		√		√	√	
Big Data	2		√		√	√	
Signal and Image Analysis	2		√		√	√	
Global Earth and Planetary Geophysics	2		√		√	√	
Exploration Geophysics	2		√		√	√	