ASIIN Seal
Accreditation Report

Bachelor's Degree Program
Mathematics
Mathematics Education
Physics
Physics Education

Master's Degree Programme
Mathematics Education
Physics Education

Provided by
Universitas Negeri Jakarta

Version: 05.04.2024

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]
Sarjana Matematika	Bachelor of Mathematics	ASIIN	BAN-PT	12
Sarjana Pendidikan Matematika	Bachelor of Mathematics Education	ASIIN	BAN-PT	12
Magister Pendidikan Matematika	Master of Mathematics Education	ASIIN	BAN-PT	12
Sarjana Fisika	Bachelor of Physics	ASIIN	BAN-PT	13
Sarjana Pendidikan Fisika	Bachelor of Physics Education	ASIIN	BAN-PT	13
Magister Pendidikan Fisika	Master of Physics Education	ASIIN	BAN-PT	13
Date of the contract: 27.06.2022 **Submission of the final version of the self-assessment report:** 09.05.2023 **Date of the onsite visit:** 12.10.2023 **at: Campus Universitas Negeri Jakarta**				
Expert panel: Hilda Assiyatun, Institute of Technology Bandung Roniyus Marjunus, Universitas Lampung				

[1] ASIIN Seal for degree programs.

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

Andreas Müller, University of Geneva Hans-Georg Weigand, University of Würzburg Alexandra Dreiseidler, Emil-Fischer Gymnasium in Euskirchen Andre Saputra, student at Institute of Technology Sepuluh Nopember	
Representative of the ASIIN headquarter: Andrea Kern	
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 10, 2015 Subject-Specific Criteria of Technical Committee 12 – Mathematics as of December 9, 2016 Subject-Specific Criteria of Technical Committee 13 – Physics as of March 20, 2020	

B Characteristics of the Degree Programs

a) Name	Final degree (original/English translation)	b) Areas of Specialization	c) Corresponding level of the EQF[3]	d) Mode of Study	e) Double/Joint Degree	f) Duration	g) Credit points/unit	h) Intake rhythm & First time of offer
Bachelor of Mathematics	S. Mat. / B.Sc.	-	6	Full time	-	8 semester	144 sks / 216 ECTS	annually in August, 2002
Bachelor of Mathematics Education	S.Pd. / B.Ed.	-	6	Full time	-	8 semester	145 sks / 217.5 ECTS	annually in August, 1999
Master of Mathematics Education	M.Pd. / M.Ed.	-	7	Full time	-	6 semester	43 sks / 111.8 ECTS	annually in August
Bachelor of Physics	B.Sc. / S.Si.	-	6	Full time	-	8 semester	144 sks / 216 ECTS	annually in August
Bachelor of Physics Education	S. Pd. / B.Ed.	-	6	Full time	-	8 semester	145 sks / 217.5 ECTS	annually in August
Master of Physics Education	M.Pd. / M.Pd.	-	7	Full time	-	6 semester	39 sks / 101.4 ECTS	annually in August

The Jakarta State University ("Universitas Negeri Jakarta" or UNJ) is a well-known public state-owned higher education institution in the capital of Indonesia. It was established in 1964 by merging the Jakarta Institute of Teaching and Education ("Institut Keguruan dan Ilmu Pendidika"), the Institute of Teacher Education, and the Faculty of Education from the Universitas Indonesia. The new institute was committed to the training of professional teachers and educators. In a new step in the development, UNJ was officially founded in

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

1999 as one out of four public universities in Jakarta. This transition represents a shift from the initial focus of education to a full university offering also non-educational study-programs. Today, UNJ represents most prominent state-owned universities in Indonesia; it is still renowned especially for its high quality in teacher education.

Associated with UNJ are “labschools” to act as a teaching laboratory where teachers in training could practice and conduct research. After opening the first labschool in 1968, this concept has proven as very successful. UNJ is associated with four labschools in and around Jakarta with an additional one currently in construction. The labschools offer kindergarten education, elementary schools as well as junior and senior high schools. Each campus has its own focus, offering more opportunities in arts, humanitarian studies or science. According to representatives of the labschools and UNJ, these schools have a high reputation and count among the best schools in the country.

UNJ was declared by the Regulations of the Ministry of Research, Technology, and Higher Education “to become a reputable university in Asia.” This state policy gives guidelines for the organization and development of UNJ. In its mandate, UNJ emphasizes on creating knowledge in the fields of technology, arts, sports, and humanities in its education and non-education programs. UNJ aims to increase the interaction between its departments and enhance its international representation. UNJ considers that a successful international accreditation will benefit their international recognition and strengthen their position across Asia. In addition to study programs in Indonesian language, UNJ offer international programs completely organized in English. UNJ’s vision shall be reached until 2045. During the on-site visit, UNJ further presents a strategic plan for the next five years as well as annual targets. Within the same declaration, UNJ defined their mission “to conduct the excellent three pillars of higher education which benefits humanity.” The three pillars or Tri Dharma comprise activities in teaching, research and community service, which have to be performed by all employees of UNJ.

UNJ has four major campuses in east and south Jakarta. It is divided into eight faculties: Education, Languages and Arts, Mathematics and Natural Sciences, Social Sciences, Engineering, Sport Sciences, Economics, and Psychology Education. In addition, a faculty organizing the postgraduate programs. Each year, UNJ enrolls more than 5,000 new students annually in its 97 study programs, reaching 34,199 students in 2021. Of those, 62 are international students. The strategic plan aims to increase the number of international students considerably by actively advertising their study programs on an international level. Currently, it employs 981 academic and 799 additional staff members. Currently, the campus in East Jakarta is under reconstructions, which are scheduled to be finished in 2024.

All study programs under review are associated with the Faculty of Mathematics and Natural Sciences (FMIPA). The faculty offers academic, vocational and professional education study programs. FMIPA is mainly responsible for the organization and further development of these study programs. In the self-assessment report (SAR), it describes its mission as:

1. "Organising high quality teaching and learning by utilising information and communication technology to produce qualified graduates who meet the needs of stakeholders and can compete at the Asian level.
2. Creating a conducive academic atmosphere, creating a religious atmosphere in every academic and non-academic activities, and fostering students' entrepreneurial skills
3. Organising research and development activities in MIPA and MIPA education in line with the development of science and technology.
4. Organising community service activities related to MIPA and MIPA education.
5. Establishing and developing cooperation with various institutions at home and abroad."

In the future, FMIPA aims to continue to develop their programs to contribute to solve social, educational, economic, political and security challenges on national and international level by applying science, technology and innovation in the industrial revolution 4.0.

For the bachelor's degree program *Mathematics*, UNJ has presented the following vision and mission on the webpage:

"VISION

To become a study programme that excels in mathematics and its applications and actively collaborates at the Asian level.

MISSION

1. Organizing effective educational and teaching activities, efficient in a commercial academic atmosphere, Responsibility, Accountable and transparent to produce a mathematical scholar who is able to compete at the ASIAN level;
2. To conduct research activities in mathematics and its applications conduct devotion activities in societies associated with mathematics and application
3. Create a high academic culture, fostering entrepreneurial abilities, and create a religious atmosphere in every academic and non academic activity.
4. To establish communication and cooperation with institutions both inside and abroad related to mathematical development and utilization."

For the bachelor's degree program *Mathematics Education*, UNJ lists the following vision and mission on their webpage:

"VISION

Becoming an excellent study program in the field of basic knowledge of mathematics education, technology and learning innovation through collaboration at the Asian level.

MISSION

1. Organizing quality, effective, efficient educational activities in an academic atmosphere that is conducive, responsible, religious, accountable and transparent.
2. Carrying out research activities to develop mathematics education and provide solutions to mathematics education problems.
3. Organizing community service activities in the field of mathematics education that are meaningful, inspiring, useful, and follow developments in science and technology.
4. Establishing cooperation between domestic and foreign agencies, and the community to carry out education, research and service."

For the master's degree program *Mathematics Education*, UNJ's webpage names the following vision and mission:

"VISION

To become a study program that excels in developing mathematics education knowledge, technology, and advanced learning innovations through collaboration with various institutions at the Asian level.

MISSION

The mission of the Master of Mathematics Education Study Programme is to:

1. Facilitate the effective and efficient management of the academic process to produce professionals and experts in the field of mathematics education, both in theory and practice, as well as enhance global competitiveness. This must be carried out in a conducive, responsible, accountable, and transparent academic atmosphere.
2. Engage in collaborative research activities with domestic and international institutions. Through research, innovate various methods of mathematics education and

ensure their results are disseminated in various domestic and international scientific forums.
3. Improve the quality of mathematics education and learning in the community by carrying out community service activities."

The bachelor's degree program in ***Physics*** presents itself on their webpage with the following vision and mission:

"VISION

To become an excellent study programme in fundamental knowledge of material physics, instrumentation physics, and computational physics through collaboration with various institutions at the Asian level.

MISSION

The mission of the FMIPA Physics Study Program, Jakarta State University is:

Carrying out quality education and teaching activities in the field of physics by utilizing information and communication technology to produce graduates who are religious, love their country, are able to think critically, have an educational outlook, have high integrity and concern, and are able to collaborate actively at the national and international levels in completing problems for the benefit of humanity and civilization."

For the bachelor's degree program Physics Education, UNJ defines the following vision and mission:

"VISION

"Become a Study Program that excels in Physics Education which is enriched with a media-based learning environment of advanced information technology through collaboration at the Asian level."

MISSION

1. Preparing qualified physics education personnel so that they are competitive, able to research and apply them to educational institutions at the national and international levels.
2. Preparing graduates to be able to continue their education to a higher level.
3. Improve the ability of lecturers and students in research in the field of physics and its application in accordance with their field of interest.

4. Preparing graduates who have scientific insight, skills, entrepreneurship, and sports values so that they are able to develop themselves in society."

UNJ lists the following vision and mission for the master's degree program *Physics Education*:

"VISION

"To become a superior study program in physics education that is enriched with a media-based learning environment based on advanced information technology through collaboration at the Asian level."

MISSION

Develop superior education and trained and qualified graduates in accordance with local, regional and international market needs in the field of physics education.

Develop cutting-edge research and quality publications to support innovation and 21st century skills in physics education.

Developing community service for the development of local communities in physics education."

C Expert Report for the ASIIN Seal

1. The Degree Programme: Concept, Content & Implementation

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

Evidence:

- Self-assessment report
- Objective-module matrix of each study program
- Diagrams of the PLO achievement of each study program
- Webpage UNJ https://www.unj.ac.id/en/
- Webpage FMIPA https://fmipa.unj.ac.id/mipabaru/en/
- Webpage Ba Mathematics https://fmipa.unj.ac.id/mtk/
- Webpage Ba Mathematics Education https://fmipa.unj.ac.id/penmat/en/
- Webpage Ma Mathematics Education https://fmipa.unj.ac.id/s2pmath/
- Webpage Ba Physics https://fmipa.unj.ac.id/physics/
- Webpage Ba Physics Education https://fmipa.unj.ac.id/physicsedu-b/
- Webpage Ma Physics Education https://fmipa.unj.ac.id/physicsedu-m/
- Discussion during the audit

Preliminary assessment and analysis of the experts:
The five study programs under review are managed by the FMIPA, who is responsible for program objectives and the program learning outcomes (PLOs). UNJ presents in their documents qualification profiles for each study program.

The experts approve UNJ system to collect data to improve the study programs continuously. Especially, they consider the tracer studies as well integrated. The program coordinators furthermore explained how they previously adapted the PLOs because of their stakeholder feedback. UNJ outlines the mechanism to integrate the stakeholder feedback in the following flow chart:

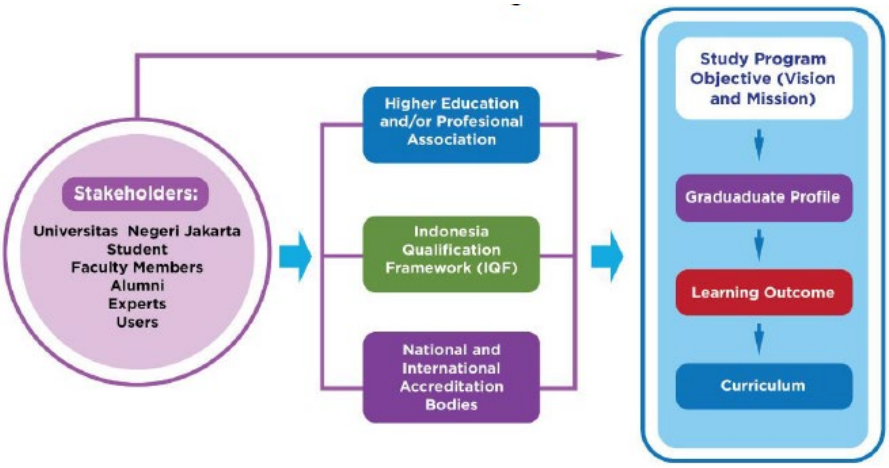


Figure 1: Illustration of the mechanisms to develop the PLOs.

According to the self-assessment report (SAR), the objectives of the study program *Mathematics* combine aspects of character building, social consciousness and environmental awareness with subject-specific aspects. The competences of the study program shall enable the graduates to find jobs across Indonesia and Asia. Next to the core skills in the field of Mathematics, students learn to make strategic decisions effectively based on data analysis and to develop solutions based on their solid mathematical foundations. The study programs further introduce the students to scientific work in mathematics at an Asian level and with the aim to benefit the society. UNJ states that the most common occupations include professional educators, research assistants, data analysts, and experts in the field of finance, banking and actuary.

Based on the objectives, UNJ has developed the following program learning outcomes (PLOs):

Area	Code	Program Learning Outcome
Social Competences	PLO 1	Uphold the values of humanity in accordance with religion, morals, and ethics.
	PLO 2	Internalize independence, perseverance, and entrepreneurship.
	PLO 3	Able to maintain and expand professional networks with supervisors, colleagues, and peers inside and outside the organization.
	PLO 4	Able to conduct self-evaluation on the team under their responsibility and to manage teaching and learning independently.

Specialist Competences	PLO 5	Able to make appropriate decisions to solve problems within their expertise, based on information and data analysis.
	PLO 6	Able to document, store, secure, and retrieve data to ensure validity and to prevent plagiarism.
	PLO 7	Master the theories of mathematical concepts, e.g. mathematical logic, discrete mathematics, algebra, analysis and geometry, probability, and statistics.
	PLO 8	Master the principles of mathematical modeling, linear programming, differential equations, and numerical methods.
	PLO 9	Capable to conduct research independently or in groups that can be used to guide stakeholders in choosing diverse alternative solutions to problems in mathematics.
	PLO 10	Able to develop mathematical thinking, from procedural/computational understanding to advanced understanding, including exploration, logical reasoning, generalization, abstraction, and formal proving.
	PLO 11	Able to observe, recognize, formulate, and solve problems through a mathematical approach with or without software.

The experts review the PLOs of the program *Mathematics* and conclude that these are in relation to the subject-specific criteria of the ASIIN Technical Committee 12 – Mathematic. The experts acknowledge that students possess sufficient knowledge of the fundamentals in mathematics; the students are able to apply their knowledge to solve problems in mathematics. The experts consider the training in practical standard software and programming adequate; further, they consider the students reach competences to independently scientifically analyze mathematical programs on a level of a bachelor program.

UNJ describes in their submitted SAR that the bachelor degree program *Mathematics Education* provides the students with a professional education building the character of students suitable the requirements in the education sector. The program focuses on competences in pedagogy combined with skills in mathematics. The objectives further state that students will receive an introduction to scientific works to provide innovative, creative solutions concerning problems in the field of mathematics education. Reportedly, graduates work as professional mathematics educators or research assistants in the field of mathematics education.

UNJ has published the following PLOs for the bachelor program *Mathematics Education*:

Area	Code	Program Learning Outcome
Social Competences	PLO 1	Uphold human values accordance with religion, morals, and ethics.
	PLO 2	Internalizing the spirit of independence, perseverance, and entrepreneurship.
	PLO 3	Able to understand themselves as an educator.
	PLO 4	Able to work in a team, social awareness, and concern for community and environment.
Specialist Competences	PLO 5	Mastering the theoretical concept of mathematics, including mathematical logic, discrete mathematics, algebra, analysis and geometry, probability, and statistics.
	PLO 6	Mastering in modeling mathematical concepts, linear programs, differential equations, and numerical methods.
	PLO 7	Able to conduct, analyze, and apply research outcomes to improve the mathematics learning process.
	PLO 8	Able to plan, implement, and evaluate learning in learning mathematics.
	PLO 9	Able to employ various learning resources and mathematics learning media.
	PLO 10	Able to solve problems in real situations based on knowledge of mathematics education.

After studying the SAR, the experts consider that the social and specialist competences of the study programs Mathematics Education match the intended qualifications. The experts highlight that graduates of the program possess capabilities in mathematics and pedagogy. The program provides the students with competences to conduct mathematical analysis based on the fundamental concepts of mathematics. The experts conclude that the students learn sufficient knowledge to evaluate research outcomes critically. Furthermore, the experts consider that the students get substantial theoretical and practical training to teach in the classroom.

In the SAR, the university describes the objectives of the master program *Mathematics Education*. The study program supports the students to become experts as professional educators. After graduation, they shall be able to critically analyze concepts, theories and innovation to solve problems in mathematics education. In addition, graduates need to possess high academic capabilities, social competences, competitiveness and motivation for life-long learning. According to the SAR, graduates from this study program work as professional educators and researchers.

UNJ has determined the following PLOs for the master program *Mathematics Education*:

Area	Code	Program Learning Outcome
Social Competences	PLO 1	Internalize and implement the values of Divinity, Humanity, Diversity and Justice.
Specialist Competences	PLO 2	Understanding and analyzing pedagogic concepts and theories of learning mathematics comprehensively.
	PLO 3	Develop creative and innovative mathematics learning designs.
	PLO 4	Mastering and applying various assessment and evaluation techniques in the process of mathematics education.
	PLO 5	Mastering, analyzing, and proving concepts, principles, procedures, and theorems in mathematics.
	PLO 6	Apply concepts, principles, procedures, and theorems to solve mathematics problems.
	PLO 7	Conduct research with the correct methodology to solve problems and create innovations in mathematics learning.
	PLO 8	Develop and apply Information Technology and Communication (ICT) in the management of learning organizations.

The experts approve the objectives and program learning outcomes of the study program. They agree that the master program *Mathematics Education* allows the graduates to advance their knowledge in mathematics and pedagogy. The experts highlight that the graduates reach qualifications to synthesize pedagogical theories and mathematical concepts; this enables them to continue in the further development of this field as researchers and educators. The experts positively remark the focus on research including publications and presentations.

According to the SAR, the objectives in the bachelor program ***Physics*** emphasize that graduates have capabilities in concepts and methodology of physics. They can apply these competences in related fields of science and technology. The study program provides students with skills to collaborate effectively and actively in teams, communicate their ideas and solutions and have a basic understanding of management processes. The education represents the basis for life-long learning in formal and informal higher education. Thus, the program fosters creative, innovative and adaptive personalities with the motivation to contribute to the advancement in science and technology. UNJ describes that graduates find occupation as professional physics educators, physics research assistance or practitioners.

Area	Code	Program Learning Outcome
Social Competences	PLO 1	Demonstrate a religious manner, uphold values of humanity and nationalism, and internalize the value of self-reliance, discipline, responsible, critical thinking, innovative, communicative, and collaborative in solving different problems.
	PLO 2	They are competent to work in team and independent, documented and analyse data to discover scientific assertions that correspond with standard scientific principles, communicate verbally and in writing, publish the paper, as well as super-vise and assess to establish accurate solutions.
Specialist Competences	PLO 3	They are advanced knowledge of relevant specialized classical theoretical physics and modern physics using mathematical and computational concepts.
	PLO 4	They are qualified to accomplish theoretical analysis by fundamental principles of physics and mathematical concepts to generate models or simulations that correspond to hypotheses.
	PLO 5	They are capable to demonstrate by involve the fundamental principles of physical measurement and scientific methodology to interpret data and formulate physics phenomena.
	PLO 6	They have acquired instrumentation and computational expertise in physics, synthesize and characterize material to expand it to another field.

	PLO 7	They have advanced their knowledge in technology that using physics principle and employ physical concept to applied to relevant subject by utilize the development of science and technology in accordance with the field of work.
	PLO 8	They are competent to improve their knowledge and continue study to a higher level.

The experts discuss the presented PLOs in reference to the ASIIN subject specific criteria of the Technical Committee 13 – Physics. The experts miss clear explanations in some of the PLOs, especially concerning the PLO 3 (regarding modern and classical physics) as well as PLO 6 (regarding the mission of the study program and their three different specializations). After receiving a detailed explanation and additional documentation, experts, are satisfied with the correspondence of the PLOs and the ASIIN subject-specific criteria.

UNJ defines the objectivs of the bachelor program *Physics Education*; the study program offers the students competences in physics as well as in physics education. The program introduces the students to skills in scientific research and entrepreneurship. Students' competences include integrity to develop themselves in society. Graduates from this program are qualified to pursue a higher degree or work as educators or research assistants. The university indicates that graduates from this program work as professional educators, physics research assistants or practitioners.

The university included the following PLOs for the bachelor study program *Physics Education* in the SAR:

Area	Code	Program Learning Outcome
Social Competences	PLO 1	Demonstrate a professional attitude in work based on religious values, human values and culture.
	PLO 2	Demonstrate an attitude of critical thinking, innovative, collaborative and communicative in solving problems in the field of physics education
Specialist Competences	PLO 3	Able to comprehend concepts in classical and modern physics.
	PLO 4	Involve mathematical, computational, and measurement protocols in order to solve the physics problem.

	PLO 5	Capable to implement pedagogical content knowledge technology (TPACK) in advancing, implementing and evaluating physics learning.
	PLO 6	Capable to utilize fundamental principle and applied physics, identify problem, discover alternative solutions based on theory and research, constructed and implemented in physics education research.
	PLO 7	Capable of conducting education, management of physics laboratory, and practicum in accordance with the HSE (Health Safety and Environment) principle.
	PLO 8	Capable to enhancing another related competence with applied physics.

The experts review the presented PLOs and conclude that they combine important aspects of education, physics and character development of students. The experts consider all these aspects as central to become successful in the field of physics education. The experts remark positively that the PLOs focus on the application of knowledge in physics, including competences besides the field of education such as management of physics laboratories.

The program objects of the master program ***Physics Education*** supplies the students with additional competences to work and develop themselves professionally in the field of physics education. The graduates contribute innovative work in the field of physics education. In addition, the study program advances their skills to conduct quality research, which is recognized national and internationally. UNJ describes that the study programs trains the students to find occupation as professional educators, researchers, consultants, and media developers.

For the master program ***Physics Education***, UNJ has developed the following PLOs:

Area	Code	Program Learning Outcome
Social Competences	PLO 1	Able to develop logical, critical, systematic and creative thinking through scientific research in the field of physics education.
Specialist	PLO 2	Master advanced knowledge of classical physics and modern physics.

	PLO 3	Able to design innovative physics learning in accordance with curriculum demands by using appropriate evaluation and assessment techniques.
	PLO 4	Able to develop learning aids by utilizing advanced information technology and the student environment.
	PLO 5	Able to propose various alternative solutions to physics education problems with an inter- and multidisciplinary approach.
	PLO 6	Able to design scientific research to solve physics education problems.
	PLO 7	Able to carry out scientific research in the field of physics education based on scientific methodology, logical, critical, systematic and creative thinking.
	PLO 8	Able to produce scientific articles that are novel, and publish them in accredited national scientific journals, international seminar proceedings, or international journals.

The experts note that the PLOs of the bachelor and master programs are clearly distinct. According to the opinion of the experts, the master programs is characterized with a stronger focus of the development and improvement of physics education bridging to research. This includes advanced knowledge in the field of science as well as the application of technology to develop learning tools. The experts summarize that they approve the competences highlighted in the PLOs of the master program *Physics Education*.

Concerning the achievement of PLOs, the program coordinators describe that they measure the achievement of the PLOs during the students' course evaluation. The students answer in UNJ's online system, which will generate a score between 0 and 100. These results indicate, to which degree the PLOs of one module were reached. Based on this survey, the information is combined to illustrate the achievement of the PLOs of the study programs. During the on-site visit, the experts observe how the PLO achievements are calculated and approve the analysis.

During the on-site visit, the experts ask the program coordinators to describe the relation between the study programs in education and in science, which are all associated with the same faculty. The program coordinators provided descriptions of the study programs in a given academic field and the related bachelor and master education programs Mathematics Education and Physics Education. The experts appreciate this explanation and suggest

including these specifications in the module handbooks, as they are helpful and informative for students.

The industry representatives describe to the experts that they are satisfied with the qualifications of the students and graduates they receive from the study programs under review. The industry representatives from the area of education highlight that the graduates are successful teachers in their schools and have good competences to manage students in the classroom. Other stakeholders, including research centers, schools, and companies in education and finance, report that they characterize the students as very competent. Many visit them to conduct research, where students show great skills in time management and high familiarity with the current curricula. In general, they emphasize the good attitude of the graduates, who are actively engaged in their subjects. The industry representatives mention that alumni from UNJ have already received top positions at their institutions since they had good foundations and were capable of learning and adapting. Nevertheless, the industry representatives claim in the discussion with the experts that they have never been invited to review the study programs or give suggestions to the curriculum.

In addition, the students emphasize their high level of satisfaction with the study programs and their chances on the job market. The students highlight that they choose to study at UNJ because this university has a high reputation and that they are content with their study programs. Alumni further report that they are well accepted in their current professions and that the qualifications at graduation meet the competences for their jobs.

These explanations allow the experts to conclude that the study programs under review are well-established and accepted. The experts summarize that UNJ has defined objectives and PLOs (intended competence profiles) for their study programs. These are transparently anchored and published on the university's webpage and thus are available to students, lecturers and interested third parties. The experts confirm that the presented objectives and learning outcomes reflect the targeted academic qualification level. However, the experts emphasize that in the bachelor program *Physics* and *Physics Education* and the master program *Physics Education*, objectives and PLOs in the these three programs need to be updated to show a clear alignment.

After reviewing the submitted documents and the discussions during the on-site visit, the experts reach the conclusion that the qualification profile of each study program under reviews allows the graduation to work in the profession in correspondence with their level of education (European Qualification Framework 6 and 7). Thus, the experts consider that the competences of the graduates match the demands of the labor market and the society.

Although the experts can see evidence that the study programs are reviewed on a regular basis, there is room for improvement in the systematic collection of feedback regarding

their partners from the industry. The experts suggest UNJ should stronger include its stakeholders in the further development of the study programs. They recommend to regularly collect feedback on the objectives, learning outcomes and qualification profiles and consider this in the future development of the study programs under review.

Criterion 1.2 Name of the Degree Programme

Evidence:

- Self-assessment report
- Diploma Supplement
- Webpage Ba Mathematics https://fmipa.unj.ac.id/mtk/
- Webpage Ba Mathematics Education https://fmipa.unj.ac.id/penmat/en/
- Webpage Ma Mathematics Education https://fmipa.unj.ac.id/s2pmath/
- Webpage Ba Physics https://fmipa.unj.ac.id/physics/
- Webpage Ba Physics Education https://fmipa.unj.ac.id/physicsedu-b/
- Webpage Ma Physics Education https://fmipa.unj.ac.id/physicsedu-m/

Preliminary assessment and analysis of the experts:
After studying the submitted documents, the experts approve the names of the study programs under review. The program titles are in line with the regulations of the government of Indonesia. The experts consider that the titles of the degree programs reflect the intended objectives and learning outcomes as well as the teaching and learning content. The designation (both in the original language and in English) is used consistently in all relevant documents and on the UNJ's webpages.

The experts acknowledge that graduates from the bachelor program *Mathematics* receive a "Bachelor or Mathematics" whereas graduates from the bachelor program *Physics* receive a "Bachelor of Science." In both, the bachelor program of *Mathematics Education* and the bachelor program of *Physics Education*, a "bachelor of education" is awarded. After graduation, students receive a "master of education" after completing their studies in the master program or *Mathematics Education* and the master program of *Physics Education*.

Criterion 1.3 Curriculum

Evidence:

- Self-assessment report
- curricular overview of each study program
- Objective-module matrix of each study program
- Module handbook of each study program
- Overview table of the student mobility
- Discussion during the audit

Preliminary assessment and analysis of the experts:

Structure of the programme

The bachelor programs under review can be completed in eight semesters whereas the master programs have an indented study duration of four semesters. All study programs are comprised of university courses, faculty courses, compulsory courses, elective courses and within the MBKM program (Independent Learning-Independent Campus or Merdeka Belajar-Kampus Merdeka program). All programs in education further include courses in the field of pedagogy. The study programs are structured in courses (equal to modules). University courses contain among others, modules such as Pancasila, Indonesian Language, and Citizenship. Examples of faculty courses are Olympism or Philosophy of Science.

At UNJ, the MBKM program can be used to take part in off-campus learning for at least one semester with a workload of 20 Indonesian credit points (sks). Students can apply to take part in student exchange, teaching assistance, independent research, industry internships, community service programs, humanitarian programs, independent study, and entrepreneurship.

Table 1. Structure of selected study program showing the workload of each component in Indonesian credit points (sks).

	Ba Mathematics	Ba Mathematics Education	Ma Mathematics Education
University	14	14	8
Faculty	3	3	0
Compulsory	89	97	31
Pedagogy	0	7	0
Elective	18	4	4

MBKM	20	20	0
total	144	145	45

Table 2. Structure of selected study program showing the workload of each component in Indonesian credit points (sks).

	Ba Physics	Ba Physics Education	Ma Physics Education
University	14	14	8
Faculty	3	1	0
Compulsory	96	94	25
Pedagogy	0	7	0
Elective	44	9	6
MBKM	52	20	0
total	144	145	39

UNJ describes that the content in each study program is grouped according to "subject matter" which distinguish between general and basic knowledge (e.g. Pancasila, Civic Education, English), Final Project/Scientific description (e.g. Research Methodology, Seminar, Field work, Thesis) and subject specific components. The bachelor thesis (Undergraduate Thesis) has a workload of four sks converted to six ECTS (European Credit Transfer and Accumulation System) credit points. With the exception of the eighth semester, the workload of each semester varies between 19 and 21 sks credits (or 27 and 31.5 ECTS credit points). The master thesis (Thesis) has a volume of six sks credits, which convert to 20.8 ECTS credit points. The workload per semester in the master programs *Mathematics Education* is higher than in the bachelor program and ranges from 14 to 15 sks credit points (36.4 to 39 ECTS credits). The third semester requires the students to finish 12 sks credits (20.8 ECTS credits) and the fourth semester 8 sks credits (20.8 ECTS credit points). In contrast, the master program Physics Education consider a workload of 12 to 13 sks credit points in the first and second semester, whereas the third semester requires 6 sks credits (15.6 ECTS credits) and the final semester 8 sks credits (20.8 ECTS credit points).

Overall, the experts consider the structure of the study programs as adequate. Concerning the bachelor programs *Mathematics* and *Mathematics Education*, the experts detect a high

number of courses in the SAR. The program coordinators explain that the presented high number combines compulsory and elective courses; the students of *Mathematics* chose elective courses (18 Indonesian credits), whereas the compulsory courses have 89 credits. The minimum number of electives courses is significantly lower in the bachelor program Mathematics Education (four sks). The long lists are the results of a high number of possible elective courses. In the opinion of the experts, there might be a long list of courses offered, but the amount of credits dedicated to electives is rather low. However, the experts acknowledge the difficulties in balancing the core content of a study program with electives. The students are content with the number of credits spend on electives in the programs in the field of Mathematics, which is accepted by the experts.

In contrast, the students in the *Physics* programs want to increase their selection of courses. The experts consider it would be of advantage to open electives of the Physics program also to *Physics Education*. This would also give the students of both programs more opportunities of electives, which actually take place, as the minimum number is five students to start a course.

The experts question the content of education in the bachelor programs *Physics Education*. The experts calculate that the content of education reaches only 5% of the curriculum whereas the international standard ranges around 30%. The program coordinators correct the experts and state that the program consists of 10% general courses (15 credits), 31% pedagogical courses (46 credits), and 59% compulsory courses (84 credits). They add that content on education is integrated in a high number of their courses; the list provided in their comment seems to be sufficiently comprehensive. According to the program coordinators, the content is moreover not limited on the courses on education but is also part of the scientific compulsory courses. In addition, they highlight that there is also the teaching practice. The program coordinators emphasize that all students in the bachelor programs *Mathematics Education* and *Physics Education* take a course in the fifth semester on teaching skills. In addition, they take a six-month internship in the seventh semester, which they spend at schools. Further, the program coordinators explain that all teachers in public schools in Indonesia need to complete an additional one-year teacher-training program to receive permission to work as an educator in Indonesia (Pre-Service Teacher Professional Education or PPG). During this year, the graduates will learn additional competences and practice in teaching. The experts acknowledge the additional teacher training; this was not clearly presented in the submitted documents. The experts comment that they still miss explanation on this internship since it was not adequately presented in the curriculum overview. Furthermore, no module description was presented on the internship in schools.

The students of the bachelor programs *Mathematics Education* and *Physics Education* confirm that they are required to complete a teaching internship with a duration of six months.

They consider the practical experience crucial for their studies. The students spend time in schools, where they will stepwise get involved in teaching. The internship is structured and provides assistance and supervision by representatives at the school. The lecturers from UNJ need to visit each student during their internship between two and five times to observe their progress. The students emphasize that teaching internships are compulsory during the bachelor and master in *Mathematics Education* and *Physics Education*. Overall, the students and the teaching staff consider that they have a good balance between the courses in science and education. In the discussion with the industry representatives, people from schools and universities were present. They confirm that students from UNJ are well prepared for their teaching internships. Therefore, the experts conclude that the students in the bachelor and master programs of *Mathematics Education* and *Physics Education* receive sufficient knowledge and skills in education.

During the onsite visit, part of the expert team has the opportunity to visit the labschool located next to the UNJ main campus. The experts consider the conditions at the labschool as very good. However, they learn that only in rare cases, the students of the education programs receive the opportunity to take their teaching internship in the labschools associated with UNJ. In the discussion with the experts, the students state that they are aware of these schools; however, they only know single individuals who took their teaching internship there. These people, who are today alumni from UNJ, report that the school was very supportive during their internship and that they had an overall very positive impression. In the discussion with the industry representatives, also teachers from the labschools are present. They confirm that students from UNJ come to their schools and practice their teaching skills. Although the teaching staff reports to the experts that collaborations with the labschools take place for research, the experts wonder why the interactions appear limited. Therefore, they recommend increasing the collaborations concerning internships and research.

In addition to the teaching internship, the students can engage in off-campus learning in the MBKM program. Several students report to the experts that they took courses at other universities inside Indonesia (e.g., courses on artificial intelligence). Although there was no thematic overlap with courses at UNJ, the recognition of credits was unproblematic. Other students in the bachelor program *Physics* took part in an internship in Japan for three months. This company has a collaboration with UNJ and regularly accepts students for internships. Thus, the student considers the internship supported by UNJ and well organized. In the bachelor program *Physics*, over 70% take part in the various MBKM program; many of them choose to take part in internships in the industry or at research institutions. In the bachelor program *Mathematics*, the experts notice that a lower number of students took parts in internships the MBKM program. The majority took courses outside UNJ. All industry

representatives confirm that they accept students for internships within the MBKM program. The experts consider the MPBK program as a positive initiative from the government. They continue to recommend to the students to collect experience outside the university campus. Overall, the experts appreciate UNJ's support in organizing internships within the study programs under review.

Overall, the experts consider that the structure of the study program under review allows the students to acquire skills and knowledge in an organized order. Each module of the curricula represents a well-matched unit of teaching and learning. The experts confirm that the order of the modules ensures that the learning outcomes can be achieved and that the programme can be completed within the standard period of study. The experts acknowledge that all study programs allow the students to take part in an internship. They approve that internships are mandatory in the bachelor and master programs *Mathematics Education* and *Physics Education*. In this regard, the experts emphasize that the cooperation with UNJ's labschools should be intensified, which should result on more opportunities for students to conduct their teaching internship at these schools.

The experts appreciate that each curriculum allows the students to select electives and take part in off-campus learning to develop their individual focus. However, the experts consider the total amount of credits in the bachelor and master program *Mathematics Education* is low. They suggest that the number of credit points allocated to elective courses in these two study programs should be increased.

Content

UNJ presents in its self-assessment report an overview of the curriculum of each study program. All bachelor programs contain a set of modules of basic knowledge courses to enhance the competences of the students in character building, communication skills and basic scientific insight. In addition, subject-specific modules guide the students to enhance their skills and allow them to gain knowledge.

In the bachelor program *Mathematics*, UNJ has determined "subject matters" focusing on geometry and analysis, algebra, statistics and probability, applied mathematics, and computation. In the bachelor program *Mathematics Education*, students take courses in the field of pedagogical and didactics as well as mathematics and its application. The master program *Mathematics Education* is divided in education, mathematics and research.

The bachelor program *Physics* focuses on classical physics, mathematics, computing and ICT, measurements and experiments, modern physics, and applied physics. Regarding a sufficient coverage of theoretical physics, the descriptions and information provided thus far are not fully satisfactory. There are no dedicated courses for theoretical physics, and if

the UNJ physics programs follow a strategy of courses integrating experimental and theoretical physics, there is no information about this in the program description and module handbooks. The experts therefore highlight that UNJ needs to clearly present the integrated content in the module handbooks or establish a single course if the topic is currently not covered in the curriculum. The experts issue similar concerns about the bachelor and master study programs *Physics Education*. In this regard, UNJ needs to submit precise information and documentation on the curriculum, presenting the sub-disciplines mentioned in the ASIIN subject-specific criteria. If these subjects are integrated in other modules, the modules descriptions need to clearly state this and give accurate information on the content.

The curriculum of the bachelor program *Physics Education* contains modules in the area of classical and modern physics, electronics and instrumentation, elementary science, mathematics and computing, physics education and learning skills and research, evaluation and scientific development. The master program *Physics Education* groups its content into advanced and general abilities, pedagogic abilities and educational research abilities.

The experts also acknowledge that UNJ already provides opportunities for students to enhance their programming skills and learn on big data. Elective courses further allow the students to gain insight into machine learning and artificial intelligence.

The experts further consider the involvement of the students in research projects as positive. The students and alumni describe to the experts various ways that the lecturers motivated them to engage in research. Alumni also mention that they were able to publish the results of their final thesis due to the strong support of their lecturer. To learn the basics for conducting scientific research and writing manuscripts, each student is required to take the course on “Research methods.” Examples for research projects includes projects with visually impaired students to understand equations (*Mathematics Education*) or ideas to foster critical-thinking skills in STEM education (*Physics Education*).

The experts got also a positive impression on the students’ English skills. The students explain to the experts that they include English textbooks and reading materials in almost every lecture. In addition, they use English in the classroom frequently, e.g. giving English presentations. The experts learn that UNJ currently encourages their students to write their bachelor thesis in English to increase the visibility of their research work. The students from the programs *Mathematics* and *Mathematics Education* add that they have several elective courses to practice their English. These include courses, where group work and discussion are organized fully in English. Joint courses are further offered in collaboration with universities in Taiwan or Malaysia for example. The industry representatives support this state-

ment; they are satisfied with the students' English competences. Representatives from international schools notice that the students are capable of teaching their subjects in English. In addition, the industry representatives also positively comment on the communication skills of the students and graduates in the programs under review.

During the on-site visit, the experts receive more information on the type of exercises integrated in the curricula. The program coordinators confirm that students need to complete various kinds of exercises. Next to the face-to-face learning in the class, students have to complete independent and structured assignments. These assignments contain homework as well as projects. Based on governmental regulations, all courses should contain case-based and project-based learning; therefore, lecturers often integrate reading assignment, writing assignments and project-based assignments. For learning practical content, including calculations and experiments, student tutors support the lecturers. The experts learn that these tutors are senior students. Although the integration of tutors is similar in all four bachelor programs under review, the organization of the tutorship differs. The experts notice that while the tutors in the bachelor programs *Physics* and *Physics Education* are coordinated jointly by the student organizations and the program coordinators, the tutorship in the bachelor programs *Mathematics* and *Mathematics Education* is still informal. The experts strongly recommend organizing the support of tutors to the study programs since they consider them essential to support the students' practical learning process.

During the visit in Indonesia, the experts learn that in Indonesian schools, students with disabilities and special needs are integrated in classes. However, the experts cannot find this topic represented in the curriculum of the bachelor programs *Mathematics Education* and *Physics Education*. The program coordinators highlight that they conduct research for the education of students with disabilities since 1997. In addition, they collaborate with the Association of blind student and other organizations of students with disabilities to improve their learning on campus. Therefore, they integrate this topic in their courses on science learning at university level. They additionally emphasize that they have a central service for students with disabilities at UNJ. Nevertheless, the students consider themselves not prepared to teach students with disabilities and special needs. The students are aware that UNJ has also a specific education program for students with special needs, but consider this topic not sufficiently addressed in their own curriculum. The experts conclude that there is the need to include content of education for children with disabilities and special needs in the bachelor programs *Mathematics Education* and *Physics Education*. This should include students with low intelligence. The students need to know at least the basics to heighten their awareness of these children's needs and the ability to treat them with empathy and understanding.

The experts continue to discuss the curriculum content regarding the bachelor program *Physics*. The experts consider that the title of the presented subject matter are often confusing considering the associated courses. The experts and the teaching staff proceed with the discussion of this curriculum to clarify in which modules the students learn particle physics, elementary principle physics or theoretical physics. Nevertheless, the experts consider that UNJ needs to thoroughly revise its module titles and descriptions to properly demonstrate the content of each module to the students and third parties (see also criterion 4.1).

After studying the documents and the informative discussion during the on-site visit, the experts gain the impression that the curriculum of each study programs allows the students to achieve the intended learning outcomes. The module handbooks give detailed information on the learning outcomes of each module, which are available for all students and third parties. The experts consider that the content of the modules allows the students to achieve the overall program objectives. The experts continue to point out the need to organize tutorships in all study programs to support the students during exercises and practical learning. Furthermore, the experts want to emphasize the importance of learning how to integrate students with disabilities and special needs into the classroom. The experts therefore want to draw UNJ's attention on the need to address this topic in the curricula of the bachelor and master programs *Mathematics Education* and *Physics Education*. This topic should be sufficiently covered in order to allow every students to know the basics how to integrate students with special needs and disabilities into their daily teaching activities and which are the major issues that might require additional consideration.

Student mobility

In the discussion, the representatives of the university describe to the experts that they are currently trying to increase the number of international students at UNJ as well as student mobility in general. Currently, international students come mainly from China, East Timor, Yemen and Somalia to finish their degrees at UNJ.

The students are aware of other possibilities to spend one semester abroad and know students, who went to Malaysia or Saudi Arabia. Based on the submitted material, the experts acknowledge the international student mobility at UNJ. The experts notice that bachelor and master students take part on international conferences, where they are invited to present their research. Short courses and long-term stays abroad are most common in the bachelor program of *Physics Education*, who engage in webinars, seminars, student exchange programs and teaching internships. Students in the bachelor program *Mathematics Education* are also involved in teaching internships. The students in the bachelor and master programs on education explain to the experts that UNJ offers international teaching

internships. For example, students from different study programs in education took part in this teaching internship in Singapore for six month. UNJ offers this internship twice each year and everyone is welcome to apply. Based on the submitted documents, the experts learn that a similar teaching internship is also available for the Philippines. While students in the master program *Mathematics Education* attended international conferences, the master students in *Physics* are involved in international research collaborations and conducted research in Malaysia and Turkey. Although the experts approve the current student mobility, they advise that students should spend more time at other institutions inside or outside Indonesia. They highlight the importance and benefit for students to take part in courses and internships abroad or spend an entire semester at a different university.

UNJ highlights that students can also go abroad for a full semester with the MBKM program. Students are allowed to collect 20 sks credits during their stay; UNJ especially appreciates courses in relation to soft skills and practical skills including teaching internships. Funding for international MBKM is available from the government, which offers various support schemes. UNJ organizes tracer studies to confirm how the international experience benefits the students on the job market as well as graduate satisfaction surveys.

The experts further acknowledge that UNJ invites international guest lecturers to stay for six months at UNJ to teach courses. Therefore, the experts conclude that UNJ supports international exchange. They consider that UNJ actively promotes student mobility through an appropriate framework and support systems.

Periodic Review of the Curriculum

According to the evidences presented by UNJ, the experts confirm that the curricula of the bachelor programs *Mathematics*, *Mathematics Education*, *Physics*, *Physics Education* as well as the master program *Mathematics Education* and *Physics Education* undergo regular revisions. Internal reviews consider the suitability of the curriculum in reference to the department, the demand of the study program in society as well as the labor market requirements. UNJ is in regular contact with professional associations and insiders the feedback of students, alumni and other external stakeholders. It follows the trends and development in science and technology and is committed to the needs of the society. Moreover, institutional changes can lead to updates of the curriculum considering new requirement and policies.

The last curriculum updates took place in 2020-2021 and focused on the implementation of the MBKM program. Other changes were based on the advances in the field of ICT and technologies developed in the framework of Industry 4.0. Soft skills were stronger integrated in the content of the lectures and digital skills (programming, big data) was expanded in the curricula of the different programs.

In summary, the experts are satisfied with the mechanism in place to update the curricula. The experts confirm that these updates take place on a regular basis and that changes are documented.

Criterion 1.4 Admission Requirements

Evidence:

- Self-assessment report
- UNJ webpage https://www.unj.ac.id/en/
- Student statistics 2017-2022
- Discussion during the audit

Preliminary assessment and analysis of the experts:
According to the Self-Assessment Report, the admission procedures and policies for new students in the study programs follow the governmental regulations of Indonesia. The students need to have completed high school and pass a national and school final examination. The number of newly admitted students depends on the faculty and the study program based on their resources. The admission is organized centrally by the university in cooperation with a national body for the entrance tests at the Ministry of Research, Technology, and Higher Education. There are three different ways by which students can be admitted to a bachelor study program at UNJ:

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

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

3. University written entrance test (Mandiri), students are selected based on a written test (similar to SBMPTN) held by UNJ.

According to the self-assessment report, UNJ admits 30% of the students though the process (1), 40% though process (2) and 30% through process (3).

UNJ presents the following statistics on the admission in their self-assessment report

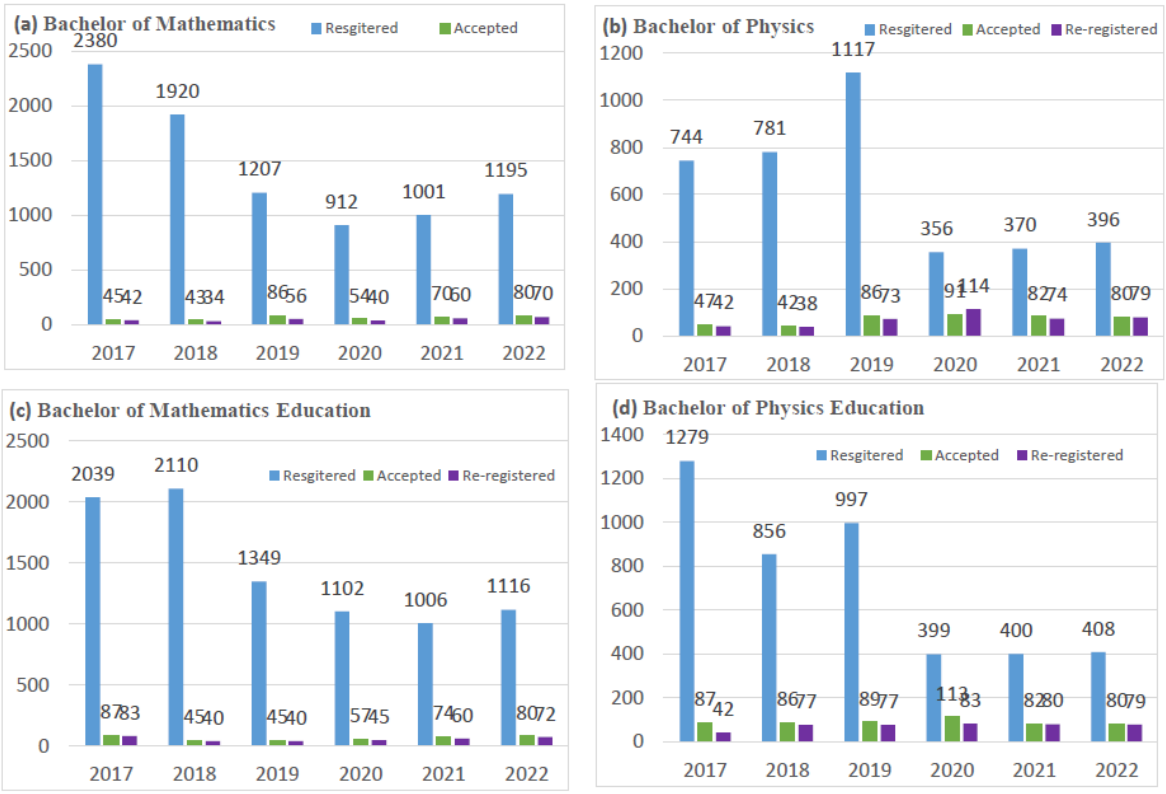


Figure 2: Overview of the number of registered, accepted and re-registered students for the bachelor program Mathematics (top left), Physics (top right), Mathematics Education (bottom left) and Physics Education (bottom right) in the years 2017 to 2021.

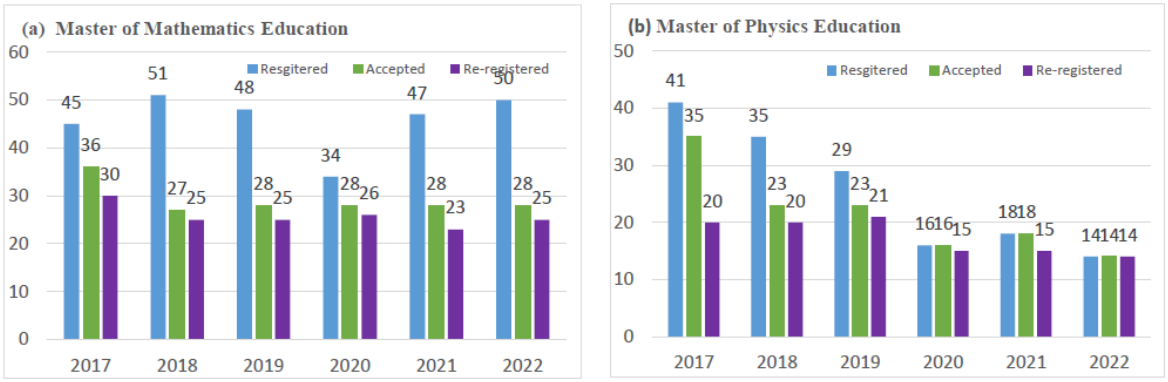


Figure 3: Overview of the number of registered, accepted and re-registered students between the years 2017 and 2022 for the master programs Mathematics Education (left) and Physics Education (right) (source: self-assessment report).

The experts identify that the number of admitted students ranges around 5.5% and is low in comparison to the number of applicants. The representatives of the rector's office acknowledge these numbers and remind the experts that the number of students is determined by the number of lecturers in this field. They restrict the number of new admissions in order to maintain a student to staff ratio below 30 to 1.

The experts are interested in the selection process of the admission, particularly if the interest and qualification in pedagogy or didactic criteria are considered for the study programs in education. The representatives of the rector's office explain that the admission criteria are generally following the governmental regulations. In the past, they had special selection processes in the education programs, where applications needed to state their motivation to become a teacher. They have once suggested to the government to re-consider their decision on special criteria for education programs; however, currently none are integrated for the selection of students during the admission process. The experts consider the motivation to become a teacher as important and they would therefore welcome such selection criteria. However, they are aware of UNJ's governmental restrictions and accept current admission criteria.

The experts learn that UNJ provides support for students missing qualifications. Students can join lectures to compensate their missing competences and skills. In addition, students enrolled in education programs can collect experience in education, such as schools, and during extra-curricular activities. Moreover, the representatives of the rector's office describe to the experts that there exists a have regulation for the recognition of past learning. This regulation was established in 2021 and applies predominately for students, who could not finish their studies at a different university in Indonesia. As one example, the university names financial problems to cover their tuition fees. The achievements of such students are accepted at UNJ, which allows them to continue their studies. Similar recognition is available for students, who were previously engaged in their profession. Depending on their qualification and skills, these students receive permission to skip courses in their curriculum. In both cases, an internal review is required to evaluate the students' qualification in the recognition process. The experts acknowledge UNJ's regulation.

Concerning the master program *Mathematics Education* and *Physics Education*, the program coordinators explain that it is possible to enter the program having a bachelor in either the education program or the scientific program. The mandatory teaching experience for the master programs in education can complete their teacher training next to their studies. In some cases, the students hold bachelor's degree in *Mathematics* or *Physics* and were previously employed as teachers. In these cases, the students are allowed to enter the programs without restrictions.

Although the experts learn that UNJ supports students with disabilities and special needs, UNJ still does not allow the admission of color-blind students. The experts are aware that as a public university, UNJ supports the access of handicapped students and questions why students in the physics programs exclude color-blind students. They suggest that all students should be given equal opportunity to pursue the subject of their interest. Therefore,

UNJ should show similar support for color-blind students as for other students with disabilities or special needs.

Criterion 1.5 Workload and Credits

Evidence:

- Self-assessment report
- Curricular overview
- Module handbook of each study program
- Tables for conversion of the Indonesian credits to ECTS credits for the bachelor programs
- Tables for conversion of the Indonesian credits to ECTS credits for the bachelor programs
- Student workload analysis (appendix 1.6)
- Workload analysis tool presented during the on-site visit
- Discussion during the audit

Preliminary assessment and analysis of the experts:
UNJ describes in its self-assessment report that they have implemented a credit point system following national regulations. The load of one credit (SKS) is determined by the Indonesian government and differs between the bachelor and the master programs.

For the four bachelor programs under review, UNJ presents the following conversion table of SKS credits to the European Credit Transfer and Accumulation System (ECTS) credits.

Definition of 1 credit in the form of learning			
a	Lecture, Response, Tutorial		
	Lecture	Structured task	Individual learning
	= 50 Minutes/week/semester = 0,83 hours x 16 weeks = 13,33 hours	= 60 Minutes/week/semester = 1 hour x 16 weeks = 16 hours	= 60 Minutes/week/semester = 1 hour x 16 weeks = 16 hours
Total: 45,33 hours= 1,5 ECTS			
b	Seminars or similar forms of learning		
	Seminar	Individual learning	
	= 100 Minutes/week/semester = 1,67 hours x 16 weeks = 26,72 hours	= 60 Minutes/week/semester = 1 hour x 16 weeks = 16 hours	
Total: 42,72 hours= 1,4 ECTS			
c	Laboratory practices, internship, research, student exchange, entrepreneurship, community services, or similar forms of learning		
	= 170 Minutes/week/semester = 2,83 hours x 16 weeks = 45,28		
Total: 45,28 hours= 1,5 ECTS			

Figure 4: Calculation of the conversion rate from one SKS credit to one ECTS credit for bachelor study programs (source: self-assessment report).

UNJ describes further that the workload in the master programs differs; the master programs consider a higher workload associated with structured and independent assignments. This results in a higher workload according to ECTS regulations. However, the workload definition depends on the type of module.

UNJ presents the following conversion table in their self-assessment report.

Definition of 1 credit in the form of learning		
a	Lecture, Response, Tutorial	
	Lecture	Structured task and Individual learning
	= 50 Minutes/week/semester = 0,83 hours x 16 weeks = 13,33 hours	= 240 Minutes/week/semester = 4 hours x 16 weeks = 64 hours
Total: 77,33 hours= 2,6 ECTS		

Definition of 1 credit in the form of learning		
b	Seminars or similar forms of learning	
	Seminar	Individual learning
	= 100 Minutes/week/semester = 1,67 hours x 16 weeks = 26,72 hours	= 60 Minutes/week/semester = 1 hour x 16 weeks = 16 hours
Total: 42,72 hours= 1,4 ECTS		
c	Laboratory practices, internship, research, student exchange, entrepreneurship, community services, or similar forms of learning	
	= 170 Minutes/week/semester = 2,83 hours x 16 weeks = 45,28	
Total: 45,28 hours= 1,5 ECTS		

Figure 5: Overview of the workload of one SKS credit t for bachelor study programs (source: self-assessment report).

After studying the documents submitted by UNJ, the experts consider that the standard workload of the students is quite high. They calculate that with 22 Indonesian credits, the students are required to work for 66 hours in one week. The program coordinators confirm that the workload is very high; however, they structure the programs with a high workload to guarantee that the students graduate on time. The program coordinators point out that the number of credits per semester is defined by the students' grade point average (GPA) of the previous semester. This allows students performing above average to take a higher number of courses while student below average receive a lower workload.

Furthermore, UNJ provides a questionnaire to the students at the end of the semester, where they should state how much time they needed to complete their courses. The quality assurance units compares these numbers to the awarded credit points to ensure the workload of one module does not exceed the listed credit points. The students of all study programs under review consider their workload as appropriate. Therefore, the expert acknowledge that the workload is high, but manageable.

The experts confirm that UNJ has implemented a credit point system, which considers contact hours, time for assignments and self-study time. This division is clearly presented in all module handbooks; therefore, all students are informed on the workload for each module. Furthermore, the experts note that all compulsory components of the study programs award credit points based on the workload they are assigned to. Although the experts consider the workload as high, UNJ closely monitors the actual workload of the students as well as their satisfaction concerning the workload. Thus, the experts conclude that mechanisms are in place to track and identify problems concerning the workload in all study programs under review. If discrepancies were identified, UNJ would review the awarded credits per module.

Criterion 1.6 Didactic and Teaching Methodology

Evidence:

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

Preliminary assessment and analysis of the experts:

After studying the self-assessment report, the experts learn that UNJ integrates in all study programs various teaching methods. These include for example group discussions, simulations, case studies (or case-based learning), collaborative learning, cooperative learning, project-based learning, problem-based learning. In addition, students can voluntarily take part in the MBKM program, which includes further learning methods such as student exchange, internships, community service or entrepreneurship.

To give an overview of the different types of teaching methods, UNJ presents the following table in its self-assessment report:

Table 3: Examples of learning activities based on different teaching methods in relation to courses.

No	Types of Learning Activities	Teaching Methods	Example of Courses
1	Lecture	Lecturing, discussion, collaborative and cooperative learning, problem-based learning, project-based learning, case-based learning	Basic Mathematics, General Physics, teaching methodology, assessment, and others
2	Practicum	Project-based learning	Programming Algorithm, Numerical Method, Elementary Physics Practicum, Modern Physics Practicum, etc.
3	Fieldwork	Project-based learning	Internship, Teaching Experience or Teaching Practice Skill, etc

UNJ points out that each course uses various teaching methods, which are selected based on the learning outcomes of the module. The learning methods combine teacher centered learning (lectures demonstrations, and practical work) and student centered learning (literature review, research, writing proposals, publications, and reports). UNJ states that is pays attention to integrate soft skills, including critical thinking, creative thinking, problem solving and analysis of real cases. The quality of teaching is assessed by the student evaluation at the end of the semester, which determines if the learning outcomes could be reached.

During the on-site visit, the teaching staff describes how they select the most suitable teaching methods in their courses. Primary consideration is the content of the course; depending on their focus (e.g. education or science), they apply different teaching methods and learning tools. For example, in education, the students learn to analyze teaching methods; in this course, the students watch lectures and analyze the methods, theory as well as the reaction of the students. In other courses, such as "Computational Physics", they evaluate the students' skills before they give project-based assignments to the students. Before the final decisions are made, a group of teachers from the department meets to discuss the selection. The same process is applied for selecting the assessment methods of each module. In addition, each department holds curriculum workshops each semester, where they also discuss the teaching methodologies.

In summary, the experts consider that UNJ has implemented a variety of teaching methods in the study programs under review. The experts confirm that the teaching methods allow the students to achieve the learning outcomes of each module as well as the study program. The experts approve the use of student-centered learning and appreciate the number of structured and independent assignments. The module handbooks give adequate information on the applied teaching methods of each module, which are designed considering a balance between contact hours and self-study time. The experts summarize that the study programs introduce the students to independent scientific work. Furthermore, the experts acknowledge that the quality of the teaching methods is monitored and updated on a regular basis during reviews.

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

Ad criterion 1.1. and 1.3.

UNJ describes in its statement that UNJ does engage with stakeholders to develop their study programs and curricula. UNJ describes it as unfortunate that the industrial partners present in the discussions were not aware of the curriculum review processes. As evidences UNJ submits invitations and screenshots of previous curriculum development workshops, where external stakeholders took part in. The experts acknowledge that UNJ included stakeholders during the last major curriculum revision of 2021. Nevertheless, the experts recommend UNJ to increase their collaboration with external stakeholders in the development of their study programs. Instead of including the stakeholders only during major revision, they suggest to distribute surveys on a regular basis with users to collect and evaluate the feedback of a wider spectrum of industrial representatives. In this format, they

could avoid considering only the opinion of only those, who are able to attend their curriculum development workshops. In summary, the experts recommend to increase the collaboration and communication with external stakeholders. Based on UNJ's statement, one requirement is changed to recommendation E1.

Ad criterion 1.3.

The experts showed concern regarding the low number of elective courses in the bachelor programs Mathematics Education and Mathematics. UNJ clarifies that their curricula follow the national regulations and offer at least four Indonesian credit points of electives. The experts acknowledge that UNJ follows the national regulations. However, considering the students' career path and interests, they continue to recommend increasing the number of credit points for electives. In their opinion, it would be beneficial for the development of the students to provide more opportunities to develop in their fields of interest. The experts approve UNJ's statement that students can take additional electives according to their interests; however, the experts remind UNJ that additional courses would potentially delay graduation and would create additional workload. Therefore, the experts continue to issue the recommendation E4.

Additional corrections requested by UNJ regarding numbers were integrated in the report.

Ad criterion 1.3 and 3.1.

UNJ describes in its statement that a close collaboration between UNJ and the labschool exists. It demonstrates that 38 students took part in internships in the labschools during the last years. The experts approve the high number and the strong collaboration in teaching and especially appreciate the speaker at Labschools' student academic orientation. However, the experts continue to issue recommendation E3 towards research (see criterion 3.1)

Ad criterion 1.3.

UNJ explains in its statement that is has revised the PLOs in the bachelor programs Physics and Physics Education. UNJ provides a new overview of the content of classical Physics in the curriculum and further demonstrates the content of theoretical physics in the elective modules for students, who are interested in this topic. However, the experts remain uncertain regarding an adequate representation of theoretical physics in several modules. For example, the module description of "Advanced Electrodynamics" does not mention Maxwell equations/theory, which are essential for all students in Physics (Education). Moreover, it remains unclear whether courses such as "Advanced Modern Physics" cover theoretical Physics, such as operator method (commutation rules), angular momentum, spin, hydrogen atom, and harmonic oscillator. The experts consider this as basic knowledge,

which should be covered in the compulsory modules of all physics programs. Adjustments regarding an adequate representation of particle physics should further be ensured. The experts acknowledge that much of the confusion could be caused by the problems of the module handbooks, which need to be corrected according to the requirement A1. The experts emphasize that an adequate representation of theoretical physics remains and issue. Therefore, they issue the recommendation E5.

Ad. criterion 1.3.

According to its statement, UNJ states that the organization of the tutor-programs is now a responsibility of the study programs as the experts had suggested during their on-site visit. Although the experts consider that the submitted material does not clearly indicate that the university is now responsible for these tutorials, a UNJ's support for tutorships is evident to the experts. They decide not to issue a requirement or recommendation on this topic.

Ad criterion 1.3.

In its statement, UNJ gives more details on their strategy to teach students with disabilities (visually impaired/deaf/physically impaired). Several module descriptions were updated in order to reflect the content accordingly. The experts are satisfied with the newly presented evidences and do not issue any recommendations or requirements.

Ad criterion 1.4.

UNJ describes in its statement that it will review the policy allowing color-blind students to study in all study programs in Physics. The experts continue issuing the recommendation A3 until this issue is resolved.

2. Exams: System, Concept and Organization

Criterion 2 Exams: System, Concept and Organization

Evidence:

- Self-assessment report
- Module handbook of each study program
- Examples of exams provided during the on-site visit
- Examples of theses provided during the on-site visit.

- Discussion during the audit

Preliminary assessment and analysis of the experts:

UNJ describes that each lecturer is responsible for assessing the students' learning through assignment and examinations. UNJ follows the national guidelines and organizes midterm and final exams during the semesters; in addition, continuous assessment is done by using quizzes and assignments (e.g., writing of papers or reports). The applied assessment methods are listed in the module handbook, which is published online and therefore available for students and third parties. In addition, the academic schedule is presented online for each study program.

According to the self-assessment report, the following grading scores are applied:

Table 4: Overview of the scoring criteria applied for assessment at UNJ (source: self-assessment report).

Comprehension	Letter Grade	Numerical Grade
Score ≥ 85 %	A	4
80% ≤ Score <85 %	A-	3.7
75% ≤ Score <80 %	B+	3.3
70% ≤ Score <75 %	B	3
65% ≤ Score <70 %	B-	2.7
60% ≤ Score <65 %	C+	2.3
55% ≤ Score <60 %	C	2
50% ≤ Score <55 %	C-	1.7
45% ≤ Score <50 %	D	1
Score < 45 %	E	0

The experts acknowledge that the programs under review consider various forms of assessment. UNJ follows governmental restrictions to integrate team-based learning, case-based learning and project-based learning into a high number of modules. Although mid-semester and final tests are still conducted in written form, the experts learn that oral examinations are getting more common. Furthermore, students are often asked to give oral presentations.

Students from all study programs confirm to the experts that they receive sufficient information on the different assessments in each module. They state that they are informed on the applied assessment forms in the first lecture along with the dates for the mid-term and final examination. The method of assessment depends on the content of the course. The students consider that the applied assessment forms in their study programs match the content of their courses. They inform the experts that in their opinion, they have enough

time to prepare for the exams. Furthermore, they report that the assessment processes are fair.

The students in the master program Physics report to the experts that they prefer written examinations. They consider that around 60% of their assessments are in written form. Exceptions are courses related to the research for their thesis. In the master program *Mathematics Education*, the students consider that 50% of their examinations are in written form while the remaining 50% examinations are based on project work.

Regarding the final thesis, the experts learn that the students of the different bachelor and master programs are satisfied with their supervision. According to the students, the lecturers start to advise the students during the process to select the topic for their final thesis. The students remark that it is possible to select a topic by themselves; in case, there is no specialist in this scientific area at UNJ, they have the possibility to invite a second supervisor with matching expertise. The second supervisor can also be from an institution abroad.

The experts confirm that a final thesis is required in all six study programs under review. While all bachelor programs contain a bachelor thesis with four sks credits (or six ECTS credit points), the two master programs contain a master thesis with six SKS credit points (equivalent to 15.6 ECTS credits). According to the experts, the presented theses clearly demonstrate that the students are able to work independently on a task at the intended level of the degree programme. The experts consider it as positive that several students could publish the research for the bachelor and master thesis. In addition, they learn in personal discussions that students are required to present their bachelor thesis at conferences. The program coordinators mention that they organize international conferences on campus annually and students are invited to give the presentations on this event. The experts appreciate that UNJ gives students to opportunity to join international conferences. However, they point out several complications that arise when making the presentations mandatory. Above all, they highlight problems for students who want to finish their bachelor thesis and might have to wait to be able to attend conferences. In addition, the experts consider that usually not all bachelor theses produce sufficient data for a full presentation at a conference. In the opinion of the experts, giving a presentation at an international event is a great advantage for students; nevertheless, it might be limiting for other students. Therefore, the experts want to recommend UNJ to reconsider this obligation but continue to support the students to take part at comparable international events.

The experts summarize that UNJ has implemented assessment methods in relation to the learning outcomes. The assessment methods differ from the specific modules. In the opinion of the experts, the assessment gives adequate feedback to the students on their competences and skills. The experts observe that UNJ has implemented various assessment

methods for their continuous assessment. It has issued transparent rules for make-up exams, non-attendance, cases of illness as well as compensation of disadvantages in the case of students with disabilities or special needs etc. Based on the discussions, the experts consider that UNJ gives the students enough time to prepare for their examination and sufficient time to work on their examinations. The organization of the exams ensures a smooth study process. The experts confirm that the assessment of the examinations is conducted in a fair manner. Furthermore, UNJ regularly reviews the assessment methods and criteria.

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

After reading UNJ's statement, the experts clarify that their comment was not in publishing the results of the thesis but on the obligatory attendance of bachelor students to a conference to present their results of the bachelor thesis. In addition, part of the presented evidences were not available in English. The experts highlight that the presentations of the research results of a bachelor thesis represents an obstacle for students to graduate on time, even though UNJ organizes at least one conference a year. The experts welcome that UNJ gives the students opportunities to participate in these events; nevertheless, they find the mandatory problematic as it might prolong students' graduation. Therefore, the experts decide on the recommendation E6.

3. Resources

Criterion 3.1 Staff and Staff Development

Evidence:

- Self-assessment report
- Staff handbook
- Discussion during the audit

Preliminary assessment and analysis of the experts:

UNJ describes in its submitted documents that each lecturer has to carry out their primary duties in teaching, research and community service. To teach in the master programs, the lecturers are required to hold a PhD.

After studying the documents submitted by UNJ, the experts conclude that the academic staff has sufficient qualifications and expertise to teach in the study programs under review. They consider that the proportion of the academic ranks are good; nevertheless,

there are still staff members holding a master degree. The program coordinators are aware of this situation and describe that UNJ is actively supporting their staff to continue their higher education. They have recently acquired external funding, which allows them to send lecturers abroad or to other universities in Indonesia. The experts welcome UNJ's support for pursuing a PhD of their staff. UNJ also provided data on the number of guest lecturers. The program coordinators explain that visiting lectures are often returning to give lectures on a regular basis. This also integrates joint courses with international lectures. Several collaborations are in place with different universities in Malaysia, but also with institutes in countries such as New Zealand.

The experts further learn that lecturers often teach in various programs. Although lecturers need to be assigned with one study program officially, a higher number of lecturers are giving courses in different study programs. For example, the Department of Physics employs 26 lecturers, but only eight are officially on the bachelor program *Physics*. The total number of lecturers is higher in the Department of Mathematics, where the total staff number is 40. The experts notice that the ratio of students to lecturer is quite high in some of the programs under review. The program coordinates confirm that they would like to employ a higher number of lecturers; however, as a state university, they need to receive approval from the government first. They are currently trying to achieve the status of an autonomous university, which would guarantee them more freedom to recruit new staff. Nevertheless, they are currently limited in number. The teaching staff supports this and emphasizes that they share their resources and staff among the different study programs. Several of their staff members have completed their degrees in education programs while other focused on science. Therefore, many lecturers are skilled to teach in both types of programs.

The teaching staff comments that they usually teach three to four courses per semester. Although they consider their workload as high, they confirm to the experts that they have enough time for their duties next to teaching, such as student supervision, community service and research. They teachers report that their workload consists of 12 credits of teaching and research. Their research partners include international project collaborations, e.g. with universities in Pakistan. The teaching staff mention, that funding is available from the faculty, from the university or from external sources. To observe the workload of the academic staff, UNJ conducts regular surveys. The last survey on staff workload was submitted together with the self-assessment report. The experts learn that the evaluation considers time, energy and stress level of the employees; as a result, UNJ can identify the workload of each study program as well as the bottlenecks of the teaching staff in general. The experts consider this a very useful tool to monitor the workload of the teaching staff.

The experts discuss the research activities of the academic personnel involved in the study programs. Currently, UNJ supports their lecturers to increase their international publications by giving incentives for research papers in Q1 and Q2 journals. Following their strategy of internationalization, UNJ further promotes to increase the level of international collaborations in research to improve the quality of their research output further. The teaching staff confirms that they receive incentives for international publications and consider this a motivation for them. The experts approve the presented statistics for each study program; nevertheless, they consider the number of international publications is low. The overall number of publications is high, yet the majority of these publications are in national journals. They identify a decreasing trend in the number of international publications in the most recent years. The experts consider that the academic staff needs to take action to increase their international visibility in the relevant community. Therefore, the experts suggest all lecturers to increase the number of international research publications. The teacher staff also approves their opportunities to improve their English skills in courses at their language center. The lecturers highlight especially the short intensive course offered by the Ministry of Education, Culture, Research, and Technology. UNJ grants its academic staff two months off to participate in this course, which focuses on writing and speaking English. According to the self-assessment report, UNJ employees have access to several scholarship programs through the government. These include training on pedagogy, including training in new teaching and learning methods. UNJ is further supporting their academic staff to attend international conferences. Staff members at the Department of Mathematics state that they take part in international conferences each year, where they give oral presentations on their research. In addition, UNJ holds annual international conferences at their campus. The teaching staff confirms that the university supports them in their further education. Within UNJ, they were invited to seek for PhD opportunities. UNJ considers a scheme, where they plan when staff members will go outside to university to pursue a higher education. According to the teaching staff, some of their colleagues are currently in Malaysia and Saudi Arabia to finish their PhD. The experts consider these opportunities and scholarships as very positive. At the moment, UNJ does not offer PhD programs in *Mathematics*, *Mathematics Education*, *Physics* or *Physics Education*; therefore, staff members need to go abroad in order to continue their studies.

The students praise their study programs and their lecturers. According to them, all lectures in the programs under review are passionate about their subject and well skilled to convey the content in the classroom.

Therefore, the experts conclude that the qualifications of the staff involved in the study programs is adequate to reach the desired level of education. The experts confirm that the lectures are supported by UNJ to join professional programs for self-development including

further higher education to earn a PhD. The experts identify that the number of staff is a limiting factor for admitting students; however, UNJ closely monitors the student to staff ratio to provide a sufficient number of staff to ensure a high quality of teaching, research and community service within the national guidelines. The experts further saw evidence that the subject-specific and didactic qualifications of the lecturers contribute adequately to the delivery of the degree programme. Nevertheless, the experts want to point out that UNJ encourages its staff to increase the number of international publications as well as the attendance of international conferences. Concerning the research of the staff involved in the bachelor and master programs in Mathematics Education and Physics Education, the experts emphasize again on the importance of the collaboration with UNJ's labschool (see criterion 1.1 and 1.3). The experts suggest that UNJ should increase its collaboration with the labschool not only concerning student internships but also towards research. Although several research collaborations were described, the experts consider the extent of these collaborations as rather low. The experts therefore consider it beneficial to both, UNJ and the labschool, to intensify the collaborations in research projects concerning mathematics education, physics education or science education in general.

Criterion 3.2 Funds and equipment

Evidence:

- Self-assessment report
- Visitation of the campus during the on-site visit
- Overview funding of each academic staff member
- Discussion during the audit

Preliminary assessment and analysis of the experts:

UNJ presented in their submitted documents an overview of the funding of the faculty, the study programs and the academics staff. As a state university, UNJ receives the major funding from the Indonesian government including lecturer salary, learning activities including, equipment consumables and materials, research funds, student operational funds, community service as well as infrastructure. Part of these funds are transferred to the faculty for operating the study programs, which also includes funding for staff development, attending international and national conferences, seminars, and workshops. In addition, each study program receives additional funds based on the number of students. According to the self-assessment report, a central budget management controls the funds allocation. Revisions take place every three months. In the discussion with the representatives from the rectorate, the experts learn that 80% of the universities total funds are allocated for

teaching and research. Out of this, 15% are used as incentives for publications of their academic staff. The faculties receive governmental funds and apply additionally for national and international research grants. UNJ provides support in grant proposal writing by offering workshops and internal proposal reviews. In the discussions with the representatives of the rector's office and the teaching staff, the experts get to know more details of recently won external funding of UNJ. This includes a grant by the Saudi Foundation Development, which awarded 80 million USD to UNJ. These funds were primarily used to continue construction works on their campuses. In addition, it also provides opportunities for the staff, including staff exchange and development.

The experts learn that UNJ generally offers research grants and incentives for their academic staff. Scientific funds are available on university level and on faculty level. To apply, the staff has to submit an online application, which is then reviewed internally by the institute of research. Grants are competitive; nevertheless, many staff members in the study programs under review are successful in achieving grants. Additional grants are available for international collaborations and national collaborations.

The experts are further informed that FMIPA is responsible for maintaining the buildings facilities including the equipment in the classroom and laboratories. This includes schedule management of the various laboratories as well as a safety management for the entire building including the laboratories. Satisfaction surveys are conducted in order to ensure a high satisfaction of the facilities. The experts confirm that the survey resented in the self-assessment report supports the high satisfactions of the users of the facilities at FMIPA.

Overall, the students are satisfied with the equipment at UNJ. They highlight the micro-teaching laboratory, which allows them to practice their teaching skills. In the opinion of the students, UNJ should put a focus on digital teaching tools in the future, including augmented reality. Students in the bachelor and master program in Physics and Physics Education also mention that all laboratories are well-equipped. The students in Physics Education emphasize that they especially have a positive experience in using the media laboratories.

The students are further satisfied with the library and access to literature; this includes the access to the library as well as the access to books and ebooks. The students positively mention that they have access to ScienceDirect to research for research articles online. Furthermore, they consider that they have a sufficient number of working spaces inside the library, the campus as well as their faculty.

In conclusion, the experts assess the financial resources as available as sufficient. The experts consider that UNJ operates on a budget that allows constituting a sustainable basis for the delivery of the study programs under review. This includes a reliable funding plan,

continuously improving facilities, and ongoing and binding national and international collaborations.

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

Ad criterion 3.1.

UNJ provide additional information in its statement on the university's policies and support of the staff to publish in English. However, the experts are aware of UNJ's strategy to increase its research output on an international level. The experts appreciate UNJ's support of its staff. However, the experts highlight the importance of international conferences and publications to all staff members and encourage them to increase their participation on an international level. The experts issue the recommendation E2.

Ad criterion 3.1.

UNJ's statement documents clearly that a significant number of students participates in internships at UNJ's labschools; however, UNJ provides only limited evidences for the research collaboration of the university and its labschools. The experts consider that the presented information regarding research appears outdated. Therefore, the experts want to encourage UNJ to increase their research collaboration with the associated labschools and systematically consider them in their research projects. They issue the recommendation E3.

4. Transparency and Documentation

Criterion 4.1 Module Descriptions

Evidence:

- Self-assessment report
- Module handbook of each study program
- Webpage Ba Mathematics https://fmipa.unj.ac.id/mtk/
- Webpage Ba Mathematics Education https://fmipa.unj.ac.id/penmat/en/
- Webpage Ma Mathematics Education https://fmipa.unj.ac.id/s2pmath/
- Webpage Ba Physics https://fmipa.unj.ac.id/physics/
- Webpage Ba Physics Education https://fmipa.unj.ac.id/physicsedu-b/
- Webpage Ma Physics Education https://fmipa.unj.ac.id/physicsedu-m/

- Discussion during the audit

Preliminary assessment and analysis of the experts:
After studying the submitted documents, the experts summarize that UNJ offers module descriptions to each module of all study programs under review on their webpage. UNJ offers online a short overview of each module as well as a full description available for download. The module handbook compiles the information of one study program; each module description is prepared by the responsible lecturer(s). It contains the module name, module level, course code, semester, responsible person and the list of lecturers, and the teaching language. It shows the relation to the curriculum, the type of teaching, the workload as well as the entire workload divided in contact hours, structured task and hours of independent study. Further information is given for the requirement according to the examination regulation, recommended pre-requisites, program intended learning outcomes, content, forms of assessment, study and examination requirements, employed media, and reading list.

After studying the module descriptions, the experts confirm that they include all necessary information is included in the module handbooks. Further, the module descriptions are accessible to all students and teaching staff. However, the experts notice that not every module listed in the curricula has an associated module description. This includes especially the internship(s) as well as final thesis (bachelor thesis as well as master thesis). Furthermore, the experts identify inconsistencies concerning the content, titles and descriptions, which call for further improvements. The experts highlight that a consistent terminology needs to be used; in addition, the module descriptions need to sufficiently present all the topics addressed in the classroom.

Criterion 4.2 Diploma and Diploma Supplement

Evidence:

- Self-assessment report
- Example of diploma certificates
- Examples of diploma supplement
- Examples of transcript of records

Preliminary assessment and analysis of the experts:
After studying the submitted documents, the experts confirm that UNJ issues a diploma certificate shortly after graduation, which is accompanied by a diploma supplement and a transcript of records. The diploma supplement contains all necessary information

about the degree program (PLOs, general skills, specific skills and knowledge) including acquired achievements, awards, and activities (extracurricular and co-curricular activities). The Transcript of Records lists all the courses that the graduate has completed, the achieved credits, grades, cumulative GPA, and mentions the seminar and thesis titles.

Criterion 4.3 Relevant Rules

Evidence:

- Self-assessment report
- UNJ webpage https://www.unj.ac.id/en/
- Discussion during the audit

Preliminary assessment and analysis of the experts:

As a state university, UNJ follows governmental rules and regulations; the UNJ statues combines internal guidelines and policies in the university, including rights and obligations of the academic community at UNJ. The Academic Guideline Book contains all information for implementing new study programs, which is available online on UNJ's webpage. After the registration, the students receive ID cards giving them access to the UNJ online system named SIAKAD. There, the students have access to all important information regarding their studies. Further, the Academic Advisor explains the rights and duties to the students.

The experts question, who is the responsible person or unit making decisions on documents and learn that different units take care of regular updating these documents. The two main units are the Center of Public Information as well as the Office of admission. Several other coordination teams are manage regulations on specific topics such as international relations or students with disabilities and special needs.

The experts reviewed the access to the rights and duties of both UNJ and the students; they consider them as clearly defined and binding. All rules and regulations are published on the university's website and hence available to all relevant stakeholders. In addition, the students receive all relevant course material in the language of the degree program at the beginning of each semester.

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

Ad criterion 4.1.

In addition to UNJ's statement, it has further handed in missing module descriptions. The experts welcome these additions. Nevertheless, the experts have the opinion that UNJ should improve the module handbooks of all study programs. The experts emphasize that in cases, the content of the lectures was not well represented in the module descriptions. Especially the content descriptions were limited and did not include all topics of the lectures. The experts conclude that UNJ needs to improve the module handbooks in order to adequately reflect the content of the classroom (requirement A1).

5. Quality management: quality assessment and development

Criterion 5 Quality management: quality assessment and development

Evidence:

- Self-assessment report
- Organigram of the quality assurance system at UNJ
- Results of different students' statistics
- Discussion during the audit

Preliminary assessment and analysis of the experts:
UNJ describes in their self-assessment report that their study programs are controlled by internal and external quality assurance. External quality assurance is based on independent institutions, international accreditation agencies or universities recognized by the government. The results need to be communicated to the National Accreditation Institution, which supervises all universities and study programs in Indonesia.

An important topic for UNJ is the academic integrity of employee and students monitored by the quality assurance unit. Regulations are available in the ethical codebook. At faculty level, UNJ conducts an academic integrity survey to measure the student comprehension of academic integrity. Furthermore, UNJ organizes annual satisfaction surveys of students and academic staff. The surveys presented to the experts during the on-site visit show continued positive results; UNJ scores above 3 in all questions (scale 1 to 4). UNJ also conducts tracer students to gain information on the types and location of employment, the salary ranges and further study opportunities after graduation. Graduates are invited to participate in these surveys online.

UNJ informs the experts further that it measures the intended learning outcomes based on the success rate of the students. Measurement components are students' examinations

(assignment, mid-exam and final exam), essays, coursework reports, laboratory reports, oral examinations, and presentations.

During the on-site visit, the representatives of the rector's office describe to the experts that they have implemented a quality assurance at university level, at faculty level and at the level of the study programs. On each level, data is continuously collected to monitor the progress. Their quality management system is PCDA-based; evaluations take place every three months. Each action plan requires approval from the rector. In addition to national and international accreditations, they conduct internal quality audits within the faculty and regarding the study program.

The experts also acknowledge that UNJ is conducting course evaluations at the end of each semester. These are mandatory and organized online in the student system (EDOM). The evaluation is based on a score between 1 to 4. The experts confirm that the presented surveys contain, among others, questions on the student services and student support, the performance of lecturers and their teaching skills. Teaching materials, assessment, and potential off-campus learning activities are considered in the survey. An additional questionnaire allows the students to evaluate their courses regarding their actual workload whereas another asked them for their satisfaction with facilities. As a result, UNJ combines the evaluations on course level, on faculty level and on university level to track the students' evaluation of one year regarding different aspects. The individual results can further be traced through each year. The representatives of the rector's office further mention to the experts that the quality assurance unit on each level will analyze the data. Each lecturer receives their individual scores. In addition, the Head of the Department will have access to scores of all lecturers of the department. They are responsible to engage with lecturers, who obtained poor results in the evaluation. If no improvement takes place over time, additional training is mandatory. Moreover, the Heads of the Department invite all students to meetings to discuss their problems with their studies. All evaluation scores are further shared with the dean of the faculty and the university management. The experts consider that UNJ puts a high effort into ensuring the quality of their study programs. They consider that UNJ has implemented strategies to successfully collect data for the improvement of their programs and lectures. However, the experts learn from the students that they are do not have access to the results of the course evaluation. The experts notice room for improvement in this regard. They advise that UNJ needs to make the results available to all involved parties of the survey. The experts suggest that the lecturers discuss the results with the students in their courses or specific events at the end of the semesters. This would allow the students to ask questions and learn on the actions taken based on the results. Alternatively, the results could be presented to the students in their online system.

The experts discuss the results of the tracer studies of each study program under review. The representatives of the rector's office explain that they monitor the study programs using the national key performance indicators. In all study programs, 70% of all graduates find jobs within the first six months after graduations. The only exception is the bachelor program in Physics where the employment rate after six months is 58%. Most graduates are employed in national or local organizations, whereas the percentages of entrepreneurs ranges between 2 and 10%. The majority of graduates further states that their current occupation matches or definitely matches the content of their studies. The data is annually analyzed by the dean of the faculty and the program coordinator of the program. Overall, the experts consider these results as positive.

Furthermore, the experts acknowledge that the dropout rate is very low. The discussion with the representatives of the rector's office reveals that UNJ differentiates between dropout students and students, who resign. Students, who decide to not continue in their current study program up until the fourth semester, are categorized as "resigned." This includes students, who decide to stop studying as well as students, who switch to another study program or university. According to the definition of UNJ, dropouts are students, who could not complete their studies within seven academic years. The experts consider this important information as it differs from the commonly used definition in Europe. Nevertheless, the experts consider the decrease in the dropout rates in the study programs under review as a positive trend.

The experts get a positive impression of the different quality assurance tools implemented at UNJ to ensure the quality of the study programs. However, their discussion with the industry partners and students reveal several shortcomings. Although the industry partners show an overall high satisfaction with the study programs, the discussion with the experts shows that they have never been invited to review the study programs or their curricula. The experts emphasize that the industry feedback is crucial to review the learning outcomes concerning the needs on the job market. Therefore, the experts point out that UNJ needs to systematically conduct survey in the industry in a regular basis. The feedback needs to be consider in the improvement of the study programs and the curricula. Moreover, the industry partners seems unaware of the purpose of the accreditation and its impact. Therefore, the experts suggest improving the feedback back to its industry partners; information should also give descriptions how they feedback was considered and which actions were developed on its basis. Similarly, the experts observe that students take part in various surveys but are not informed on the results or derived changes. The experts highlight the need of the students to receive information on the results of their feedback to demonstrate them that their feedback is taken seriously and results in actions. Thus, the

experts summarize that the students, who take part in surveys and questionnaires, are entitled to receive feedback on the results and the action UNJ takes on its basis.

In conclusion, the experts confirm that the study programs under review are subject to periodical internal quality assurance. This includes various stakeholders, but misses a stronger and systematic involvement of industry partners. The experts have access to evidence that confirms that the results of these surveys are incorporated into the continuous development of the programs. Further, the results and any measures derived from the various quality assurance instruments used (various survey formats, student statistics, etc.), but communication to the students does not take place in every survey.

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

UNJ describes in its statement how external stakeholders are invited to further develop the study programs and the curricula of the study programs under review. The experts acknowledge their involvement (see final assessment of the experts after the comment of the Higher Education Institution regarding criterion 1). The experts welcome UNJ's clarification, but point out that an increased communication and collaborations with industry partners would benefit the development of the study programs (recommendation E1).

The experts further decide on the requirement A2 to highlight that students are entitled to have access to the results of surveys they take part. In their experience, students are more motivated to take surveys seriously when they are informed on the results and get to know the consequences of their contribution. Therefore, a feedback back to the students is extremely important.

D Additional Documents

No additional documents needed.

E Comment of the Higher Education Institution (15.02.2024)

The institution provided an extensive statement including additional documents. Images and figures were not included in the presented statement here:

RESPONDS ON DRAFT REPORT OF ASIIN CLUSTER MATHEMATICS – PHYSICS FMIPA UNJ

BACHELOR OF MATHEMATICS
BACHELOR OF MATHEMATICS EDUCATION MAGISTER OF MATHEMATICS EDUCATION
BACHELOR OF PHYSICS
BACHELOR OF PHYSICS EDUCATION MAGISTER OF PHYSICS EDUCATION

FACULTY OF MATHEMATICS AND NATURAL SCIENCES UNIVERSITAS NEGERI JAKARTA JANUARY 2024

1. The Degree Programme: Concept, Content & Implementation

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

1.1.1.a. Responds:

Study programs invited industry representatives for insight into curriculum development every year. For example, in 2021, the Mathematics Study Program conducted an online Focus Group Discussion (FGD) to review the curriculum and invited several stakeholders. They were Mrs. Ainun Safangati (the Manager of Revenue Protection and Audit of PT. Citilink Indonesia) and Mr. Apipudin (the Research Director of PT. Marketing Sentratama Indonesia). Besides stakeholders, the study program also invited alumni. In the FGD, the alumni requested the curriculum update to meets the industrial needs. The supporting documents for the FGD activities (invitations, attendance lists, documentation, etc.) are available at the following link. https://drive.google.com/drive/folders/1gBRh9Xg3SLjPS6epMJnBG9rvLUN5Lxt9?usp=sharing.

The ASIIN report draft informed that the stakeholders attending the ASIIN site visit were not invited to the curriculum development/review. In fact UNJ has involved the stakeholders in the curriculum development/review FGD. Unfortunately, due to the stakeholders' busy work schedules, we cannot bring the stakeholders in curriculum development/review FGD to the ASIIN site

visit. Therefore, the stakeholders who were joined during the FGD and the ASIIN site visit were different persons. [...]

Besides the Mathematics Study program, the Mathematics Education Study Program also organized a curriculum development/review FGD by inviting alums, stakeholders, and industry partners (university lecturer, teacher, and school principal) on 12 June 2021, as shown in figure 1.1.1.a.2. [...]

Beside curriculum development FGD, the mathematics education study program also conducts graduate profile FGD. Here, the study program invited the industry representatives. [...]

Besides Mathematics and Mathematics Education, the physics study program also conducts routine curriculum review programs that invite stakeholders from industry.

Table 1.1.1.a.1 Stakeholder List at the curriculum FGD

No	Stakeholder	Representative's Name	Topic
1	Physical Society of Indonesia (PSI)	Prof. Dr. Mitra Djamal	Graduate profile (PLO) of Physics Study Programme
2	The Center of Curriculum Development and Education, Universitas Negeri Malang	Dr. Lia Yuliati, M.Pd	The Implementation of MBKM curriculum
3	Agency for the Assessment and Application of Technology Indonesia (BPPT)	Dr. Ade Sholeh Hidayat	Integrating material science research in the curriculum
4	National Research and Innovation Agency (BRIN)	Dr. Trismidanto, M.Si	The Implementation of Physics Theory in the Research Activities
5	Institut Teknologi Sepuluh November (ITS)	Dr. rer. nat. Bintoro Anang Subagyo	Strengtenen the OBE Curriculum

[...]

1.1.2.a. Responds:

The quality assurance at the faculty level has provided a satisfaction survey to get industry representatives' feedback regularly. It can be access on the following link (https://fmipa.unj.ac.id/gpjm/ and the satisfaction survey.
The survey will be distributed to the stakeholders after the MBKM program. The MBKM program includes student exchange, a research program (at the research institution, internship at the industry and school), field study and community service, entrepreneurship, an independent project, teaching practice, and a humanity project. The satisfaction survey result will be analysed to suggest improvements in the program and curriculum. The preview of the satisfaction survey instrument is shown in Figure 1.1.2.a.1. [...]

1.3.1.a. Responds:

The Bachelor of Mathematics Education program offers 12 elective courses with 30 credits/SKS, as shown in the table 1.3.1.a.1. below.

Table 1.3.1.a.1. Elective Courses of bachelor of Mathematics Education

NO	Elective Courses Bachelor of Mathematics Education		
	Course Code	Course Name	Credit
1	3115-025-2	Descriptive Geometry	2
2	3115-233-3	Nonparametric Statistics	2
3	3115-223-3	Operational Research	3
4	3115-232-3	Experimental Design	3
5	3115-213-3	Regression Analysis	3
6	3115-215-3	Multivariate Analysis	3
7	3115-946-3	Mathematical Modelling	3
8	3005-004-2	English	2
9	3115-017-2	History of Mathematics	2
10	3115-216-3	Entrepreneurship	3
11	3115-054-2	Seminar on Mathematics	2
12	0005-300-2	Community Service Programme	2
	Total		**30**

The **minimum** number for elective courses is four credits to meet the minimum student learning load, i.e., 144 credits. It corresponds to the Minister of Education and Culture No. 3 of 2020 regulation about National Higher Education Standards. Besides, students also have the opportunity to study outside the campus through the MBKM program.

1.3.2.a. Responds:

The total credits for the Bachelor of Physics Education program are 145 credits. It consists of 10% General Courses (15 credits), 31% pedagogical courses (46 credits), and 59% compulsory courses (84 credits).

Table 1.3.2.a.1. Subject of Courses and credits

Subject Of Course	In Credits	In ECTS
Pedagogical Courses	46	67.5
Compulsory Courses	84	127.5
Generale Course	15	22.5
Total	**145**	**217.5**

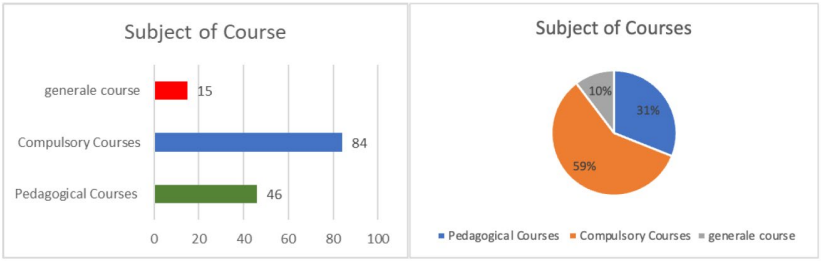


Figure 1.3.2.a.2. Distribution Course Type at Physics Education Study Program

The list and credits for pedagogical courses are shown in the table 1.3.2.a.2 below.

Table. 1.3.2.a.2. The Pedagogical courses at Physics Education Study Program

No.	Course	Credits
1	Teaching Skills	2
2	Implementing Learning Media Development in Schools (MBKM)	4
3	Implementation of the development of teaching materials in schools (MBKM)	4
4	Implementation of the development of Instruments in schools (MBKM)	4
5	Teaching Practice	6
6	Research Method for Education	3
7	Teaching Materials Development	2
8	Learning assessment	2
9	Curriculum analysis	2
10	Development of Physics Learning Media	2
11	Learning theory and learning	2
12	Foundation of education	3
13	Science learning strategy	2
14	Student Development	2
15	Science Learning Design	2
16	English For Teaching	2
17	Education Overview	2
		46

We have integrated education into several (scientific) compulsory courses, as shown in table 1.3.2.a.2. Therefore, the education content is provided in the education and scientific courses. Besides, it is also supported by the teaching practice program.

1.3.3.a. Responds:

The Teacher Professional Education Program, or PPG, is a post-graduate program provided by the Ministry of Education to train the participants to become professional teachers. The PPG participants must hold a bachelor's degree to enroll in the PPG. The ministry decides the participants' list. Therefore, the PPG is not managed by the study program of Mathematics Education or Physics Education. That is why we did not provide the PPG information in the SAR document. The PPG details information is available on the following link https://ppg.kemdikbud.go.id/

1.3.4.a. Responds:

UNJ has involved Labschool in several programs such as research, general lecture, and teaching practise. Some of the program run with the lecturers at the faculty of Mathematic and Natural Sciences UNJ. The following programs were research collaborations at labschool. The details are as follows

Yuli Rahmawati conducted “22 century skill of Labschool student through STEM Project in chemistry” research project in 2020. [...]

Furthermore, I Made Astra, Ummiati, and M. Jannah from the physics department conducted research and publication on "Pengaruh Model Pembelajaran Problem Posing Tipe Pre-Solution Posing Terhadap Hasil Belajar Fisika dan Karakter Siswa SMA" in 2012.

[...] https://www.academia.edu/3805056/jurnal_karakter_siswa

In the last three years Labschool Kebayoran invited a lecturer of UNJ to be a speaker at Labschool students academic orientation. The pictures below show Dr. Meiliasari, S.Pd., M.Sc, a lecturer of Bachelor of Mathematics Education as a speaker at Labschools' student academic orientation. [...]

Moreover, some students also conduct teaching practice at labschool the data is shown by the following figure.

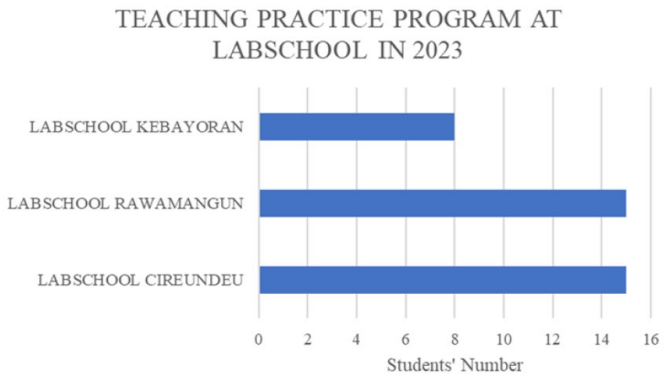


Figure 1.3.2.4.a.5. Teaching Practice at Labschool

1.3.5.a. Responds:

The internship program is one of the mandatory courses in the Mathematics Study Program Students who have completed at least 110 credits (165 ECTS) can take the internship program. This activity is also a form of MBKM activity.. Not only that, just like the Physics Study Program, the students of Mathematics Study Program also take courses at other universities inside Indonesia, for example for Differential Calculus courses (in collaboration with the Universitas Pendidikan Indonesia) and Financial Mathematics (in collaboration with Universitas Indonesia). Apart from that, the Mathematics Study Program also has collaborated with one of the lecturers from the Applied Science Department, The Northcap University, India, in Zotero training course activities. Therefore, basically the activities of MBKM Physics Study Program activities are equivalent to the Mathematics Study Program. Evidence of MBKM activities carried out by Mathematics Study Program students can be seen at the following link https://drive.google.com/drive/folders/11bmDo9Pk_z_1wqeK_ybjgvSLsI2YtfjC?usp=sharing.

1.3.6.b. Responds:

Regarding the UNJ and Labschool collaboration, responses have been given in section of 1.3.4.a

We would like to confirm that both Master of Mathematics Education and Master of Physics Education do not have an internship program.

1.3.7.a. Responds:

The Bachelor of Mathematics Education program offers 12 elective courses with a total of 30 credits as shown by the table 1.3.4.a.1 below.

Table 1.3.4.a.1. Elective course of Bachelor of Mathematics Education

NO	Elective Courses Bachelor of Mathematics Education		
	Course Code	Course Name	Credit
1	3115-025-2	Descriptive Geometry	2
2	3115-233-3	Nonparametric Statistics	2
3	3115-223-3	Operational Research	3
4	3115-232-3	Experimental Design	3
5	3115-213-3	Regression Analysis	3
6	3115-215-3	Multivariate Analysis	3
7	3115-946-3	Mathematical Modelling	3
8	3005-004-2	English	2
9	3115-017-2	History of Mathematics	2
10	3115-216-3	Entrepreneurship	3
11	3115-054-2	Seminar on Mathematics	2
12	0005-300-2	Community Service Programme	2
	TOTAL		30

Master of Mathematics Education

The Master of Mathematics Education offers seven elective courses whose total credits are fifteen. The courses are listed on the table 1.3.4.a.2. below.

Table 1.3.4.a.2. Elective Course of Master of Mathematics Education

No	Course Code	Course Name	Credit
1	31362062	Mathematical Modeling	2
2	31363022	Discrete Mathematics	2
3	31362022	Realistic Mathematics Teaching and Learning	2
4	31363012	Mathematical Higher Order Thinking	2
5	31362042	English for Mathematics Teaching and Learning	2
6	00000012	Leadership in Learning Organizations	3
7	31360032	Development of research Instrument	2

Out of the fifteen credits offered, students pursuing a Master of Mathematics Education are requested to take a minimum of four credits based on their interests. However, the minimum number of students to start a course follows the university regulation. Meanwhile, students have the opportunity for a field trip program. For example, students visited Universitas Pendidikan Indonesia in 2021, (see https://fmipa.unj.ac.id/s2pmath/en/?p=1276) and Universitas Negeri Yogyakarta (see https://fmipa.unj.ac.id/s2pmath/en/?p=1244) to learn qualitative research intensively.

1.3.8.a. Responds:

The theoretical physics terms in PLO 3 have been revised from "**They are advanced knowledge of relevant specialized classical theoretical physics and modern physics using mathematical and computational concepts**" to "**They have an extensive understanding of the concepts of classical physics and modern physics by using mathematical and computational methods to solve physics problems.**"

Classical Physics courses include Basic Physics I, Basic Physics II, Classical Mechanics, Electricity and Magnetism, Waves, Thermodynamics, Electronics. Meanwhile, Modern Physics courses include Modern Physics, Quantum Physics, Solid State Physics, Introduction to Nuclear Physics, and Statistical Physics.

For students aiming to explore further in theoretical physics, several elective courses are provided, including Quantum Mechanics, Condensed Matter Theory, and Electromagnetic Field Theory. The content and course module links for these elective courses are available in the table below.

Table 1.3.8.a.1 Elective Course of Theoretical Physics

Course Name	Content	Link
Introduction to Particle Physics	History of elementary particles	https://drive.google.com/file/d/1AiW9zDzJwICSyKaYWplqTXUwSdPyaH-z/view?usp=sharing
	Special relativity theory	
	Field theory	
	Relativistic quantum mechanics	
	The concept of symmetries	
	Gauge field theory	
Electromagnetic Field Theory	Fundamentals of Electromagnetic Theory	https://drive.google.com/file/d/1vVJaIGMGV-tYSCwIP2tlo32nGxNyRoQQ/view?usp=sharing
	Wave Theory and Wave Propagation	
	Electromagnetic Potentials and Gauge Freedom	
	Dipole Concepts and Antenna Principles	
	Advanced Topics in Electromagnetism	
Quantum Mechanics	Operator Method in Quantum Mechanics	https://drive.google.com/file/d/1O3KyrdFJKYdAOoVygEPQOiYkeXFHGGYP/view?usp=sharing
	Angular Momentum	
	Hydrogen Atom	
	Representation of Operator in Matrix Form	
	Spin of Particle	
	Perturbation Theory	
Condensed Matter Theory	Review of Quantum Mechanics	https://drive.google.com/file/d/1uqXVrThfsDU6_8Cu-uLDgWlj8a1eJM_o/view?usp=sharing
	Itinerant Electron	
	Many-body Schrodinger equation	
	Bloch Theorem	
	Electronic Structure and Magnetism	
	Theory of Bose-Einstein Condensation	

The Bachelor and Master of Physics Education differ in several aspects, including focus, objectives, courses content, and research emphasis.

a. Academic Focus Bachelor of Physics Education

The Bachelor of Physics Education program provides students with a strong basis of pedagogical knowledge, with an emphasis on cognitive, interpersonal, and intrapersonal competencies. Graduates are capable of tackling issues in physics teaching and learning while employing Information and Communication Technology (ICT) effectively. They master both theoretical and practical physics topics, incorporating pedagogical insights into the physics education arena. They demonstrate competence, competitiveness, and originality in science and physics teaching by combining theoretical principles with practical applications. Their skill set includes analyzing, developing, and implementing ICT-based learning approaches designed specifically for physics and science education. Graduates are encouraged to seek advanced study, both domestically and abroad, to promote the advancement of science, technology, and competence in physics teaching. Furthermore, they have a diverse skill set that includes scientific knowledge, entrepreneurship, sportsmanship, honesty, and integrity, which qualifies them as edu technopreneur practitioners. Their research abilities are demonstrated by experience as research assistants in Physics Education, which frequently results in articles published in national or international journals.

Master of Physics Education

The Master of Physics Education program promotes professional development by combining advanced physics knowledge with cutting-edge instructional technology. Graduates are encouraged to investigate and create novel works that contribute to the continual advancement of knowledge in the field of physics education. With a focus on quality research, they are capable of making significant contributions that are recognized both nationally and worldwide. The curriculum teaches the abilities required to conduct research that benefits society while also advancing scientific growth in the discipline. Graduates of the Master's degree show a stronger capacity to integrate advanced physics concepts with educational technologies, fostering a thorough understanding of how these elements improve teaching and learning. They are poised to be field leaders, advancing physics education through innovative work and high-quality research. The Master's program equips individuals to be effective contributors at the interface of physics, education, and technology, thereby creating good change in scientific education.

b. Career Objectives

Graduates of the Bachelor of Physics Education Study Programme are expected to be Physics Teachers, Physics Laboratory Managers, and Entrepreneurs. Whereas, the graduates of the Master of Physics Education Programme are expected to be educators, researchers, and consultants in Physics Education.

c. The Courses

Courses Categories	Bachelor of Physics Education	Master of Physics Education
Mathematics Courses	The related courses: Calculus I, Calculus II, Mathematical Physics I, Mathematical Physics II, Big Data and Programing, Computational Physics, Computational Physics Practicum, Introduction to Information Technology.	The related courses: Mathematical Methods in Physics.
	Calculus I and II, Mathematical Physics, and Computational Physics are among the courses offered in the Bachelor of Physics Education program to guide students through their mathematical journey. Students learn about the practicality of Big Data, Programming, and Information Technology, expanding their abilities for real-world applications.	The Master's program focuses on the core with a single subject, Mathematical Methods in Physics. The distinction is that the Bachelor's degree covers a wide range of math topics, but the Master's degree focuses on refining educators into accurate wielders of mathematical tools in the field of physics teaching.
Physics Courses	Courses related to this categories: Basic Physics I, Basic Physics Practicum I , Basic Physics II, Basic Physics Practicum II, Electronics, Electronics Practicum, Classical Mechanics, Modern Physics, Modern Physics Practicum, Wave, Electricity and Magnetism, Quantum Physics, Thermodynamics, Introduction to Solid State Physics, Introduction to Nuclear Physics.	Courses related to this categories: Mechanics and Thermodynamics, Electrodynamics and Waves, Advanced Modern Physics.

	Beginning the path of Physics Education, the contrast between Bachelor and Master degrees becomes clear as course offerings evolve. The Bachelor's program is distinguished by its depth, which includes basic courses such as Basic Physics, Electronics, and Quantum Physics, giving students a comprehensive grasp of the various aspects of physics. This broad exploration is reinforced by hands-on experiences in numerous practicum programs.	In contrast, the Master's program is a polished chapter in academic endeavor, emphasizing depth and higher degrees of comprehension. The courses in Mechanics and Thermodynamics, Electrodynamics and Waves, and Advanced Modern Physics dive into complexities with accuracy, building a greater knowledge in specialized topics. The Master's curriculum offers a targeted ascension into advanced areas, where the depth of knowledge reaches unparalleled heights, equipping instructors to wield a comprehensive understanding of physics with precision and authority.
Research Courses	Related courses: Research Method for Education, Statistics for Research, Science learning strategy, Learning assessment.	Related courses: Educational Research Methodology, Educational Research Statistics, Study of Research and Problems in Physics Education, Scientific Article Writing Techniques.

	The depth, progression, and breadth of courses in Physics Education degrees differ between the Bachelor and Master levels. The Bachelor's degree lays the framework with courses such as Research Method for Education, Statistics for Research, Science Learning Strategy, and Learning Assessment, which provide a thorough grasp of the principles of educational research and assessment methods.	As students graduate to the master's level, the curriculum becomes more specialized. Educational Research Methodology and Educational Research Statistics courses provide a more in-depth grasp of research procedures, with an emphasis on advanced statistical approaches. The Master's program delves deeper into specific research concerns in Physics Education and improves scientific writing abilities using Scientific Article Writing Techniques. This transition represents a change toward a more focused and sophisticated investigation, in which educators hone their research skills in order to contribute effectively to the area of Physics Education.
Pedagogical Courses	Related courses: Curriculum Analysis, Foundation of Education, Development of Physics Learning Media, Learning Theory and Learning, Teaching Skills, English for Teaching, Science Learning Design, Teaching Materials Development, Teaching Experience, Student Development, Implementing Learning Media Development in Schools, Implementation of the Development of Teaching Materials in Schools, Implementation of Instrument Development in Schools.	Related courses: Physics Curriculum and Learning Design, Innovations in Physics Learning and Teaching, Evaluation in Physics Learning, Physics Learning Multimedia Development, Instruments in Physics Education, Electronic Instrumentation for Physics Education, English for Scientific Communication, Data Science in Education, Integrated Science and the Environment.

	The shift from a Bachelor's to a Master's program in Physics Education represents a significant change in the depth, breadth, and sophistication of the courses available. The Bachelor's degree focuses on core topics, with courses such as Curriculum Analysis, Teaching Skills, and Development of Physics Learning Media. This breadth of expertise includes actual teaching experiences and media deployment in schools.	The Master's level curriculum focuses on specific fields, with courses such as Physics Curriculum and Learning Design, Innovations in Physics Learning and Teaching, and Electronic Instrumentation for Physics Education. Subjects such as Data Science in Education, which emphasize sophisticated approaches, provide a deeper knowledge. Furthermore, the Master's program includes English for Scientific Communication, demonstrating the advanced degree of communication abilities essential for scientific discourse. The transition from fundamental to specialized courses represents a move from a broad inquiry in the Bachelor's degree to a refined, advanced, and focused study in the Master's program, equipping educators for a comprehensive grasp of Physics Education.

d. Research Emphasis

Research emphasis differences between the Bachelor's and Master's degrees in Physics Education are the research objective, scope, and output. The master's degree should be more profound than the bachelor's.

Bachelor of Physics Education

1. Research Exposure: Bachelor's students are introduced to the research procedures and experiences with a limited discussion area.
2. Practical Application: They apply theoretical concepts to real-world teaching contexts, including teaching materials design, lesson plan design, and adobe instructional practices.
3. Integration of ICT: Integrate Information and Communication Technology (ICT) into physics education and apply it in the classroom.
4. Publication in Journals: The final-year students are expected to have experience as research assistants and should be able to publish their research in national or international journals. However, the research should not be as complicated as the master's level.

Master of Physics Education

1. Advanced Research Skills: Postgraduate students need to enhance their research skills in advanced research projects.
2. Theoretical and Practical Innovation: Postgraduate students should find novelty in physics education research, present new ideas, construct creative teaching techniques, or develop educational technology.
3. Research Quality: The postgraduate student should conduct research with a deep philosophical and broader scope.

4. Contribution to Society: Their research should also give society an advantage, such as enhancing educational procedures, curriculum development, or technology application in education.
5. Preparation for Leadership Roles: The postgraduate student should align their research to enhance the educational policy and academic community and promote good change.

1.3.9.a. Responds:

This scheme will be adjusted. The tutoring program will be organized by the study programs. Each study program will provide reinforcement classes for certain courses which need extra exercise. The reinforcement classes will be delivered by the junior lecturers and assisted by the senior students.
The examples of the tutorial activities for Mathematics students can be seen in the following link.
https://drive.google.com/drive/folders/1NvI6kNfCgZLL4xkdM-CUT9ahbpBRGl7RT?usp=drive_link

https://drive.google.com/drive/folders/1ngx0WqNmA-j7j-FRoGlo-MGKFrw_bqaD

https://drive.google.com/drive/folders/1XDwjExnRknAKtR5Hd9HDSlqJV0-uXQN3

https://drive.google.com/drive/folders/18aTCjlDn-5PTmXakE0q741DbW_UgjyP_

[...] Usually, the student chooses the difficult material for the tutorial. They meet and discuss twice a month or when it is close to the mid/final tes semester.
Student tutorials for the Physics Study program, in collaboration with the Badan Eksekutif Mahasiswa Prodi Fisika (student organization), were carried out online during the COVID-19 pandemic using Zoom. Some tutorial activities include Basic Physics courses, Computer Programming courses, Undergraduate Pre-Thesis Seminar course, and Undergraduate Thesis courses. Some of these tutorials are carried out in the form of the implementation of the Python program to open students' eyes to developing Computer Programming courses using the Python program. Then a tutorial was also carried out regarding making references or citations for literature in preparing a proposal or thesis for the Undergraduate Pre-Thesis Seminar course and Undergraduate Thesis courses. [...]

1.3.10.a. Responds:

Bachelor of Mathematics Education
Universitas Negeri Jakarta has a disability services guidance document. It describes learning methods for students with special needs as follows.
Visually Impaired Students

1. For blind students, test material can be presented in Braille format, soft copy, audio recording, or large print for low vision students.
2. If the formats mentioned above cannot be provided, then blind students should get the help of a reader (read by someone assigned by the university).
3. If the college cannot provide readers, blind students should be allowed to bring their readers.
4. If blind students take the test in Braille format, they should be given up to 30% additional time.

5. For evaluation assignments in papers, book reports, etc., blind students can be required to submit printouts in normal writing like students in general.
6. To carry out action tests (performance tests), for example, in sports or movement arts lessons, modifications must be made so that blind people can carry them out. For example, running a short distance requires a rope or sound to guide blind people to the finish line. This condition applies to courses that are not the main field of study in the major. For example, sports courses for blind students who major in English.

Deaf Students

1. The listening test (for example, in TOEFL) for deaf students is considered to be eliminated and replaced (compensated) by a written test (reading test).
2. If a deaf student has to undergo an oral test (interview), the interviewer must speak with clear lip movements and face them directly so that the deaf person can pay attention to the speaker's lip movements. If the communication cannot be understood this way, use a sign language translator or change it to written language (presented in writing).

Physically Impaired Students

1. Students with physical impairments who experience motor impairments that do not allow them to write should be allowed to use laptops to write test answers (especially essay tests).
2. For students with physical impairments (having motor impairments) who do not allow them to take performance tests, for example, in lectures on sports or movement arts, the implementation of the test can be modified (modification) or replaced (substitution) with an activity that is still possible to do. This condition applies to courses that are not the main field of study in the major. For example, sports courses for physically disabled students majoring in information technology (IT).
3. If the examining lecturer is unsure about the test format suitable for students with disabilities, they should discuss it with the student concerned and consult with the special services officer for students with disabilities.

We have updated the module description for course learning on mathematics for elementary school, learning mathematics for junior high school, and learning mathematics for senior high school, by adding contents regarding teaching methods for students with special needs.

Module Description of Learning on Mathematics for Elementary School

Module Name	Course Module
Module Level	Undergraduated Programme
Code, if applicable	-
Sub-title, if applicable	-
Courses, if applicable	Elementary School Mathematics Teaching and Learning
Semester(s) in which the module is taught	3th semester
Person responsible for the module	Lecturer of Courses
Lecturer (s)	Dr. Lukman El Hakim, M.Pd.
Language	Indonesian Language
Relation to Curriculum	This course is a compulsory course.
Type of teaching, contact hours	Teaching methods used in this course are: ● Lecture (i.e., grup investigation, small grup discussion, dan video-based learning) ● Structured assignments (i.e., essai and case study)
Workload	For this course, students required to meet a minimum of 135,99 hours in one semester, which consist of: 39,99 hours for lecture, 48 hours for structured assignments, 48 hours for independent study
Credit Points	3 ECTS
Requirements according to the examination regulations	Students must attend all lectures and submit all individual and group assignments scheduled before the final exam.
Recommended prerequisites	-
Program intended learning outcomes	Programme Learning Outcomes (PLO) to be achieved in this course are: PLO 7: Able to analyze research findings to improve the process of learning mathematics. PLO 8 : Able to plan, implement, and evaluate learning in learning mathematics
Course Learning Objectives	Course Learning Outcomes (CLO) to be achieved in this course are: CLO 1: Students are able to analyze the content and objectives of the elementary mathematics curriculum and its implementation at school; CLO 2: Students are able to identify the problems of learning elementary mathematics in schools in general; CLO 3: Students are able to use the latest and innovative mathematics learning theories in designing elementary mathematics learning to be able to answer these problems in accordance with the content and objectives of the curriculum.

Content	**Students will learn about:** 1. The essential mathematics topics in the elementary mathematics curriculum; 2. The relationship and sequence of learning between elementary mathematics topics; 3. The objectives of the elementary mathematics curriculum; 4. The process of learning mathematics in elementary school; 5. The content and presentation of mathematics in elementary mathematics textbooks; 6. The problems in the practice of learning elementary mathematics; 7. The relationships between theories of learning mathematics; 8. How to design a mathematical model in accordance with the subject matter of elementary mathematics; 9. How to design elementary mathematics problem solving problems; 10. How to make predictions about students' thinking processes; 11. How to analyze student work (oral or written answers) to obtain information on the level of student understanding of the subject being studied; 12. How to design innovative mathematics learning activities complete with learning tools; 13. How to carry out learning that has been designed in a teaching experiment; 14. How to reflect and evaluate the learning that has been implemented and make recommendations for improvement for further learning. 15. How to teach mathematics in elementary school to students with special needs
Forms of Assessment	Assessment of the learning process according to the following components: Presentation 20%, Project paper 60 %, Discussion and reflection paper 20%
Study and examination requirements and forms of examination	1. Attend face-to-face lectures at least 80% of the ideal number of meetings; 2. Every student must be active and participatory in lectures; 3. Be present at the class on time according to the set/agreed time; 4. Delay tolerance is 10 minutes; 5. There is a notification if you are not present in face-to-face lectures; 6. During lectures, cellphones are in the off or silent position; 7. Ask permission (by raising your hand) if you want to speak, ask questions, answer questions, leave class or other needs; 8. Respect each other and not make noise/disorder/damage in class; 9. No plagiarism and other forms of violation of norms are permitted; 10. Always keep the class clean; 11. It is forbidden to wear T-shirts/collarless clothes, flip-flops and the like during lectures.
Media employed	Laptop, Internet, LCD, Whiteboard, Zoom/Google Meet/ Microsoft Team, LMS.
Reading list	1. Dossey, J. A., McCrone, S., Giordano, F. R., & Weir, M. D. (2002), Mathematics Methods and Modeling for Today's Mathematics Classroom. A Contemporary Approach to Teaching Grade 7- 12, Brooks/Cole, USA; 2. Fortuny, J. M., Gimenez, J., & Alsina, C. (1994), Integrated Assessment on Mathematics 12-16, Educational Studies In Mathematics 27, pp. 401 – 412; 3. Franke, M. F., & KAzemi, E., (2001), Learning to Teach Mathematics: Focus On Student Thinking, Theory Into Practice Vol. 40, No. 2;

4. Gravemeijer, K. (1999), How Emergent Models May Foster the Constitution of Formal Mathematics, Mathematical Thinking and Learning 1(2), pp. 155 – 177;
5. Johnson, M., & Johnson, T. (2000), How to Solve Word Problems in Algebra Proven Techniques from an Expert, McGraw Hill, USA;
6. Kulm, G. (1994), Mathematics Assessment What Works in the Classroom, Jossey-Bass Inc., USA;
7. Lian, N., Teaching and Learning Geometry: Problems and Prospects, Masalah Pendidikan 27, pp. 165 – 178 Program Studi S1 Pendidikan Matematika – 820;
8. Mousley, J., Sullivan, P., & Zevenbergen, R. (....). Alternative Learning Trajector;
9. Morrow, L. J, & Kenney, M. J. (1998), The Teaching and Learning of Algorithms in School Mathematics, National Council of Teachers of Mathematics, USA;
10. Pappas, T. (2001), The Joy of Mathematics Discovering Mathematics All Around You, Wide World Publishing/Tetra, USA;
11. Sembiring, R. K., (2008), Apa dan Mengapa PMRI, Majalah PMRI Vol. VI No. 4;
12. Simon, M. A. (1995), Reconstructing Mathematics Pedagogy from a Constructivist Perspective, Journal for Research in Mathematics Education Vol. 26, No. 2, pp. 114 – 145;
13. Stacey, K. (....), The Transition from Arithmetic Thinking to Algebraic Thinking;
14. Uzel, D. (2006), Attitudes of 7th Class Students Toward Mathematics in Realistic Mathematics Education, International Mathematical Forum, 1, No. 39, pp 1951 – 1959;
15. Van De Walle, J. A., & Folk, S. (2005), Elementary and Middle School Mathematics Teaching Developmentally, Pearson Education Canada, Toronto;
16. Van den Heuvel-Panhuizen, M. (1996), Assessment and Realistic Mathematics Education, CD- Press, Center for Science and Mathematics Education, Utrecht;
17. Webb, N. L., & Coxford, A. F. (1993), Assessment in the Mathematics Classroom, National Council of Teachers of Mathematics, USA;
18. Weber, K., Maher, C., & Powell, A. (2008), Learning Opportunities from Group Discussion: Warrant Become the Objects of Debate, Educ Stud Math 68, pp. 247 – 261;
19. Yee, L. P. (2006), Teaching Secondary School Mathematics A Resource Book, McGraw Hill, Singapore.

Module Description of Learning on Mathematics for Junior High School

Module Name	Course Module
Module Levels	Undergraduate Programme
Code, if applicable	3115-075-2
Courses, if applicable	Learning on Mathematics for Junior High School
Semester(s) in which the module is taught	6th semester

Person responsible for the module	Dwi Antari Wijayanti, M. Pd.
Language	Indonesian Language (Bahasa Indonesia)
Relation to curriculum	This course is a compulsory course provided in the fifth semester
Teaching methods	Teaching methods used in this course are: - Lecture (i.e., collaboration learning, group discussion, and presentation) - Structured assignments (i.e., essay dan laporan kelompok)
Workload (incl. contact hours, self-study hours)	For this course, students required to meet a minimum of 154,66 hours in one semester, which consist of - 26,66 hours for lecture - 64 hours for structured assigments - 64 hours for private study
Credit points	3 ECTS
Module objectives/intended learning outcomes	- Students can understand the trends in mathematics education in theory and practice. - Students can understand the mathematics curriculum of junior high school - Students can understand the theory of learning mathematics, the essential materials of junior high school mathematics, and experiments teaching mathematics topics of junior high school.
Content	**Students will learn about:** - The latest trends in mathematics education in terms of theory and practice. The study of this course includes junior high school mathematics curriculum, theory of learning mathematics, essential material for junior high school mathematics, and experiments teaching junior high school mathematics subjects. - How to teach mathematics in junior high school to students with special needs
Examination forms	Assessment of the learning process according to the following components: active learning 10%, group assignments 30%, mid-test 20%, and final test 40%.
Study and examination requirements	**Study and examination requirements:** - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all classwork before the final test time. - Students must submit a final report to take the final exam. **Form of examination:** Forms of examination: final report, mid-test, final test
Reading List	1. Dossey, J. A., McCrone, S., Giordano, F. R., & Weir, M. D. (2002), Mathematics Methods and Modeling for Today's Mathematics Classroom. A Contemporary Approach to Teaching Grade 7- 12, Brooks/Cole, USA 2. Fortuny, J. M., Gimenez, J., & Alsina, C. (1994), Integrated Assessment on Mathematics 12-16, Educational Studies In Mathematics 27, pp. 401 – 412 3. Franke, M. F., & KAzemi, E., (2001), Learning to Teach Mathematics: Focus On Student Thinking, Theory Into Practice Vol. 40, No. 2

4. Gravemeijer, K. (1999), How Emergent Models May Foster the Constitution of Formal Mathematics, Mathematical Thinking and Learning 1(2), pp. 155 – 177
5. Johnson, M., & Johnson, T. (2000), How to Solve Word Problems in Algebra Proven Techniques from an Expert, McGraw Hill, USA
6. Kulm, G. (1994), Mathematics Assessment What Works in the Classroom, Jossey-Bass Inc., USA
7. Lian, N., Teaching and Learning Geometry: Problems and Prospects, Masalah Pendidikan 27, pp. 165 – 178
8. Morrow, L. J, & Kenney, M. J. (1998), The Teaching and Learning of Algorithms in School Mathematics, National Council of Teachers of Mathematics, USA
9. Pappas, T. (2001), The Joy of Mathematics Discovering Mathematics All Around You, Wide World Publishing/Tetra, USA
10. Sembiring, R. K., (2008), Apa dan Mengapa PMRI, Majalah PMRI Vol. VI No. 4
11. Simon, M. A. (1995), Reconstructing Mathematics Pedagogy from a Constructivist Perspective, Journal for Research in Mathematics Education Vol. 26, No. 2, pp. 114 – 145
12. Uzel, D. (2006), Attitudes of 7th Class Students Toward Mathematics in Realistic Mathematics Education, International Mathematical Forum, 1, No. 39, pp 1951 – 1959
13. Van De Walle, J. A., & Folk, S. (2005), Elementary and Middle School Mathematics Teaching Developmentally, Pearson Education Canada, Toronto
14. Van den Heuvel-Panhuizen, M. (1996), Assessment and Realistic Mathematics Education, CD- Press, Center for Science and Mathematics Education, Utrecht
15. Webb, N. L., & Coxford, A. F. (1993), Assessment in the Mathematics Classroom, National Council of Teachers of Mathematics, USA
16. Weber, K., Maher, C., & Powell, A. (2008), Learning Opportunities from Group Discussion: Warrant Become the Objects of Debate, Educ Stud Math 68, pp. 247 – 261
17. Yee, L. P. (2006), Teaching Secondary School Mathematics A Resource Book, McGraw Hill, Singapore

Module Description of Learning on Mathematics for Senior High School

Module Name	Course Module
Module Level	Undergraduate Programme
Code, if applicable	-
Sub-title, if applicable	-
Courses, if applicable	Learning on Mathematics for Senior High School
Semester(s) in which the module is taught	5th semester
Person responsible for the module	Lecturer of Courses
Lecturer (s)	Dr. Meiliasari, M.Sc.
Language	Indonesian Language

Relation to Curriculum	This course is a compulsory course
Type of teaching, contact hours	Lecture, structured project, seminar
Workload	For this course, students required to meet a minimum of 135,99 hours in one semester, which consist of: 39,99 hours for lecture, 48 hours for structured assignments, 48 hours for independent study,
Credit Points	3 ECTS
Requirements according to the examination regulations	Students must attend all lectures and submit all individual and group assignments scheduled before the final exam.
Recommended prerequisites	-
Program intended learning outcomes	Program Learning Outcomes (PLO) that can be achieved with this course are: PLO 7 : Students are able to analyze research findings to improve the process of learning mathematics. PLO 8 : Students are able to plan, implement, and evaluate learning in learning mathematics
Course Learning Objectives	Course Learning Outcomes (PLO) that can be achieved with this course are: CLO 1 : Students will be able to analyse the goals and the content of high school mathematics curriculum CLO 2 : Students will be able to identify problems and create strategies in solving problems in high school mathematics teaching and learning CLO 3: Students will be able to implement innovative instructional activity underpinned by theories
Content	**Students will learn about:** 1. The learning goals and content of highschool mathematics curriculum 2. Indentifying problems occurs in highschool mathematics teaching and learning, and develop strategies for solving the problems 3. Designing, implementing and evaluating innovative instructional activities in highschool mathematics classrooms 4. How to teach mathematics in senior high school to students with special needs
Forms of Assessment	Assessment of the learning process according to the following components: Presentation, Project, mid test, final test
Study and examination requirements and forms of examination	- Students have at least 80% of attendance - Students complete all assignments with satisfactory result Forms of examination: written test and project
Media employed	Laptop, Internet, LCD, Whiteboard, Zoom/ Google Meet/ Microsoft Teams, LMS.

Reading list	1. Standar isi, standar kompetensi dan kompetensi dasar matematika SMA/MA BSNP, 2006. 2. Lee Peng Yee, 2006. Teaching Secondary School Mathematics. Singapore: Mc Graw Hill 3. Max A.Sobel, Evan M.Maletsky. 2001. Mengajar Matematika Edisi Ketiga. Erlangga 4. Graham, K., Cuoco, A., & Zimmermann, G. (2010). Focus in High School Mathematics: Reasoning and Sense Making in Algebra. National Council of Teachers of Mathematics. 1906 Association Drive, Reston, VA 20191-1502 5. Paliwal, V. (2017). Considering Curriculum, Standards, and Assessments in Mathematics Instruction. US-China Education Review, 7(3), 144-154.

Master of Mathematics Education

There are no students with disabilities who study at the mathematics education this semester. However, the master's program has provided facilities for students with disabilities. For example, multi-storey buildings are equipped with lifts to make it easier for wheelchair users. The building is also equipped with an elevator equipped with audio and Braille information so that it can be accessed by the visually impaired. In addition, there are ramps provided to allow wheelchair users to access the building or room. There is a Guiding Block, namely a path/guideline that allows the blind to walk straight in the desired direction.

Bachelor of Physics Education

In the module description of the Science Learning Strategy course, the material "Teaching Strategies for Children with Special Needs" has been included. This is to accommodate when graduates work as teachers whose students experience special needs.

Module Name :	Science Learning Strategies
Module Level, if applicable	Undergraduate
Code, if applicable	32151162
Subtitle, if applicable :	English
Courses, if applicable :	-
Semester (s) in which the module is taught	2nd
Person responsible for the module	Dr. Hadi Nasbey. M.Si
Lecturer(s) :	Dr. Hadi Nasbey, M.Si. Fauzi Bakri, M.Si. Raihanati, M.Pd. Dwi Susanti, M.Pd. Lari A Sanjaya, M.Pd
Language :	Indonesian
Relation to curriculum	Compulsory course and pedagogic course

Type of Teaching	Teaching Method Apply in this course are: 1. Lecturing: · Peer Teaching · Demonstrations 2. Assigments: · Team-Project · Individual Reports · Individual Assignments
Contact hours per week during the semester	100 minutes
Class size	40
Workload	Total workload of this course 135.99 hours (4.5 ECTS) per semester which consist of 51 hours (1.7 ECTS) classroom activity, 42 hours (1.4 ECTS) structured task, and 42 hours (1.4 ECTS) per semester.
Credit points :	3 ECTS
Prerequisite course(s) :	-
Course Description	Learning science effectively involves understanding foundational concepts, fostering critical thinking, and engaging in practical applications. Here are some strategies to enhance your science learning are understand the basic, active learning, visual aids, experimentation and hand-ons learning, real life application, and practice problems. Teaching science learning strategies courses to students with disabilities requires a sensitive, inclusive approach that takes into account the special needs of these students. Here are some guidelines that may help you in teaching the course. We know the special needs of students, facilitate communication and collaboration. We use a variety of learning media such as text, images, audio, and video to accommodate different types of learning. We provide learning materials in accessible formats, such as text that can be read with a screen reader or sign language translation.
Course Outcomes :	After taking this course the student have ability to : CLO1. Understanding the basic concepts of the paradigm of science learning. CLO2. Analyzing the relationships between models, strategies, methods, and learning techniques. CLO3. Understanding the principles of direct learning strategies along with some of their methods. CLO4. Understanding the definition of indirect learning strategies along with some of their methods. CLO5. Explaining experience-based learning strategies along with some of their methods. CLO6. Understanding the principles of self-directed learning with some of its methods. CLO7. Explaining contemporary learning. CLO8. Demonstrating learning strategies with their methods.
Content :	1. Models, strategies, and methods of learning 2. Direct and indirect learning strategies 3. Direct and indirect learning methods 4. Various learning strategies 5. Strategies and methods of learning can apply for students with disabilities

Study/exam achievements:	Examination are conducted as unit test, as following: 1. Case Based Learning: Assesment Technique is project Assessment (for group project assessment). The weight is 55%. 2. Mid-semester exam (UTS): Assesment Technique is written test. The weight is 15 %. 3. Final semester exam: Assesment Technique is written test. The weight is 15 %. 4. Paper presentation 20%: Assesment Technique is presentation. The weight is 20%.
Media Employee:	Computer, internet, LCD, whiteboard, online platform (Microsoft Teams/ Zoom, LMS), Microsoft Excel, Microsoft Power Point (untuk materi).Power point presentation, textbook, learning management system (LMS)
Literatures :	1. Filey, Jones et al (1985), Learning Science Proces Skill. 2. Kurikulum SLTP & SMU yang sedang berlaku 3. Buku pegangan guru & siswa untuk bidang studi Fisika di SLTP & SMU. 4. Blovan B.S et al (1972) Taxonomy of Ed abs; 5. Funk, Jemes H et al (1985) Learning Science Proses Skill 6. Joyce, B., Weil, M., & Showers, B. (1992). *Models of Teaching* (4th ed.). Needham Height Massachusetts: Ally and Bacon, Boston. 7. Husmy (2001) Handout: "Strategi Belajar Mengajar Fisika",,Jurusan Pendidikan Fisika FPMIPA UPI.

1.3.11.a. Responds:

The module titles and descriptions regarding the concept of elementary particle physics and theoretical physics have been updated. We enrolled in the new course "Introduction to Particle Physics and Electromagnetic Field Theory." In the broader concept, we encouraged the students to take elective courses: quantum mechanics and condensed matter theory.

1.3.12.a. Responds:

The study programs will continue to encourage students to join international students mobility programs. The study programs together with the faculty will look for fundings to support students' international mobility programs.
https://kampusmerdeka.unj.ac.id/
https://iisma.kemdikbud.go.id/
https://pkkmdikti.kemdikbud.go.id/
https://praktisimengajar.id/
https://kampusmerdeka.kemdikbud.go.id/program/mengajar
https://wirausahamerdeka.kampusmerdeka.kemdikbud.go.id/info/
https://kampusmerdeka.unj.ac.id/pertukaran-pelajar/
https://kampusmerdeka.unj.ac.id/asistensi-mengajar-di-satuan-pendidikan/
https://kampusmerdeka.unj.ac.id/penelitian-riset/
https://kampusmerdeka.unj.ac.id/studi-proyek-independen/
https://kampusmerdeka.unj.ac.id/82-2/
https://kampusmerdeka.unj.ac.id/magang-praktik-kerja/
https://kampusmerdeka.unj.ac.id/proyek-kemanusiaan/
https://kampusmerdeka.unj.ac.id/desa-binaan/
https://kampusmerdeka.unj.ac.id/pertukaran-pelajar-ke-unj/
Besides, the university will also provide several opportunity of students mobility program with University to University and University to Industry scheme.

[...]

Criterion 1.4. Admission Requirements

1.4.1.a Responds:

UNJ does not have a policy about not allowing the admission of color-blind students. However, in some study programs, it is a requirement for prospective students not to have color blindness, especially for Physics Study Program blindness can impact students to pursue his/her studies, also in certain fields of study or occupations that rely on a strong understanding of colors. The admission rule is being reviewed to accommodate equality in access to education.

Criterion 1.5. Workload and Credits

1.5.1.a. Responds:

Student Workload

Student workload is based on the Minister of Education and Culture Regulation No. 3 of 2020 concerning National Higher Education Standards, which states for undergraduate level 1 credit is 50 minutes (face to face learning), 60 minutes for structured tasks and 60 minutes for independent learning. The number of credits students can take is based on their GPA of the previous semester as shown in the table below

Table 1.5.1.a.1. The regulation of students credit number

GPA	Maximum Credits
< 2.00	16
2.00 - 2,74	20
2.75 - 3. 29	22
> 3.30	24

Although this seems too much, UNJ's student workload meter shows that in reality students spend less time. The figure 1.5.1.a.1 shows the workload meter for English course (2 credits). It shows the average amount of time students spend per week. Students independent work is shown through their reading and writing assignments which according to the figure below, on average students only spend 0.126 hours. This is less than 2 hours per week.

Estimasi Workload (*Workload Estimates*)

Seksi / *Course Section*	Semester / *Semester*
1313600030	119
Nama Mata Kuliah / *Course Name*	SKS / *SKS*
Bahasa Inggris	2

Estimasi Worload		
Pertemuan Kelas (*Class Meeting*)	:	2.042
Tugas Membaca (*Reading Assignments*)	:	0.120
Tugas Menulis (*Writing Assignments*)	:	0.006
Tugas Terstruktur (*Other Assignments*)	:	0.037
Tugas Mandiri (*Project Base Assignments*)	:	0.709
Ujian (*Exam*)	:	0.242
Total Workload (*Workload Total*)	:	2.613

Figure 1.5.1.a.1. Students workload meter for English course (2 credits)

Calculation of student workload based on regulations Minister of Education and Culture Regulation No. 3 of 2020 concerning National Higher Education Standards, for undergraduate level:1 credit is 50 minutes (face to face learning), 60 minutes for structured tasks and 60 minutes for independent learning (theory class), we conduct for 16 meetings. For laboratory activities it is 170 minutes for one credit. 1 credits (SKS) = 1.5 ECTS.

2. Exams: System, Concept and Organization

Criterion 2. Exams: System, Concept and Organization

2.1.a. Responds:

Students are encouraged to write and publish papers based on their research. In the Bachelor program, students are asked to submit their paper to a scientific journal before they can have the thesis examination. We acknowledge the long and difficult process to be published in a journal, therefore the published paper is not mandatory.
Master's students at UNJ are required to pass by writing articles published or accepted by accredited national journals (indexed by Sinta 1 to Sinta 4) or international journals, and/or disseminating research results at national or international seminars. This regulation applied to master's and doctoral program students at UNJ, according to regulation:

https://pps.unj.ac.id/wp-content/uploads/2020/06/REVISI-EDARAN-PENYELESAIAN-STUDI-SMT-112.pdf

3. Resources

Criterion 3.1. Staff and Staff Development

3.1.1.a. Responds:

The study programmes encourage lecturers to increase their international publications numbers by conducting supporting programmes:

1. English for academic writing and writing retreat

2. The university and faculty also allocates funding for international research collaboration grants.
3. Incentive for publication IDR 20,000,000 internasional journal (Q1) IDR 17,500,000 internasional Journal (Q2) IDR 15,000,000 internasional Journal (Q3) IDR 8,000,000 internasional journal (Q4) IDR 7,500,000 internasional proceeding indexed by scopus https://lppm.unj.ac.id/wp-content/uploads/2023/07/PANDUAN-INSENTIF-PUBLIKASI-ILMIAH-2023-FIX.pdf
4. International Seminar and Conference - The 4th Science and Mathematics Internasional Conference (SMIC) https://seminars.unj.ac.id/smic2024/ - The 14th International Physics Seminar (IPS) https://ips2024.snf-unj.ac.id/
5. Each lecture enhance their international research and publication project with university partner
6. Each lecturer join professional organization which related to their field

3.1.2.a. Responds:

UNJ always support the staff to pursue their further study. Even cannot provide a scholarship, the university tries to provide some scholarship opportunity from the other parties. As example DAAD scholarship socialization on 25 January 2024. The recording of the event is available on the following link https://www.youtube.com/watch?v=C0K-mrTrINA
Taiwan scholarship socialization was conducted both online and face to face on 21 December 2023. The program report is available on the following link https://www.unj.ac.id/en/unj-berkolaborasi-dengan-taiwan-education-center-gelar-seminar-umum-beasiswa-s2-dan-s3-di-taiwan-tahun-2024/ [...]

Besides, some university partners such as Education University of Hongkong (EdUHK) also socialized the scholarship opportunity for UNJ's lecturer. The program report is available on the following link https://www.unj.ac.id/en/sosialisasi-beasiswa-program-doktor-di-education-university-of-hongkong/ [...]

UNJ's lecturer's also get scholarship from Saudi Fund, the official letter is available on the following link https://fe.unj.ac.id/wp-content/uploads/2019/09/866-SK-ttg-Penetapan-Penerima-Beasiswa-SFD-UNJ-Tahun-2019.pdf
Furthermore, hereby is the name list of lecturers who pershue their Ph.D abroad.

1. Lari Andreas Sanjaya, a lecturer at the Physics education study program, currently doing his Ph.D at UTM Malaysia.
2. Puspita Sari, a lecturer at the Bachelor of Mathematics Education recently graduated and received a Doctor of Education degree from Nanyang Technological University Singapore.

[...]

3.1.3.b. Responds:

Responses regarding the collaboration of UNJ and Labschool are provided in 1.3.4.a response.

4. Transparency and Documentation

Criterion 4.1. Module Descriptions

4.1.1.b. Responds:

Bachelor of Physics Education
Modul Description at Web

1. Undergraduate Pre – Thesis Seminar
2. Undergraduate Thesis Seminar
3. Teaching Practise

1. Module Descriptions Teaching Practise

Module Name	Course Module
Module Level	Bachelor Degree of Mathematics
Code, if applicable	3125-005-6
Sub-title, if applicable	-
Courses, if applicable	Field Working Practical
Semester(s) in which the module is taught	7th semester
Person responsible for the Module	Study Program Coordinator
Lecturer (s)	Team
Language	Bahasa Indonesia
Relation to Curriculum	Study Program's Compulsory Course
Type of teaching, contact hours	The teaching methods used in this course are: - Learning activity (group discussion, case study, and video-based learning) - Structure task (essay and case study) - Project based learning
Workload	Total workload is 272 hour (4,5 ECTS) per semester, which consists of 80 hours learning activity, 96 hours for structure task, and 96 hours individual learning (doing within 3 – 6 months in a year on company)
Credit Points	6 SKS (9 ECTS)
Requirements according to the examination regulations	Students must attend all activities based on the rule of the company they chose.
Recommended prerequisites	Students have taken 110 SKS (165 ECTS) graduate credits
Program intended learning outcomes	PLO 2. Internalize the spirit of independence, struggle, and entrepreneurship. PLO 3. Able to maintain and develop a network with mentors, colleagues, peers both inside and outside the institution. PLO 4. Able to carry out the process of self-evaluation of work groups under their responsibility, and able to manage learning independently. PLO 6. Able to document, store, secure, and retrieve data to ensure validity and prevent plagiarism. PLO 11. Able to observe, recognize, formulate, and solve problems through a mathematical approach with or without the help of software.

	Course Learning Outcomes (CLO) to be achieved in this course are: CLO 1 : Understanding how to adaptable with working environment CLO 2 : Adaptable with pressure working and work as a fast learner CLO 3 : Understanding how to apply mathematical knowledge in their assignment. CLO 4 : Can make a contribution where they work

CLO	PLO				
	2	3	4	6	11
1	√	√	√	√	√
2	√	√	√	√	√
3	√	√	√	√	√
4	√	√	√	√	√

Content	1. Based on the company they chose.
Forms of Assessment	Assessment of the learning process according to the following components: attitude 40%, professional competence 30%, reports and seminars 30%
Study and examination requirements and forms of exaination	Study and examination requirements: - Students have carried out activities for at least 3 - 6 months at the company - Students provide guidance for projects that will be presented in seminars Form of examination: Presentasion and Project Report

Media employed	Laptop, Internet, LCD, Whiteboard, Zoom/GoogleTemui/Tim Microsoft, LMS.
Reading list	Main Reference Buku Pedoman PKL (Praktik Kerja Lapangan), terbitan Pusat PKL LP3 UNJ Tahun 2020

Criterion 4.2. Diploma Supplement

4.2.1.a. Responds:

The format of the Diploma Supplement document of Universitas Negeri Jakarta contains Program Learning Outcomes (PLO) based on the National Standard of Higher Education (SN-Dikti). The PLO formulation includes elements of attitude, general skills, specific skills and knowledge. Elements of attitude and general skills have been formulated in detail in SN-Dikti, while elements of specific skills and knowledge must be formulated by a forum for similar

study programs which are the characteristics of graduates of that study program. Based on the PLO, the curriculum of the study program can be developed. In the international accreditation process, we try to restructure the PLO based on SN-Dikti into two aspects, namely Social Competences and Specialist Competencies (as ASIIN determines) without changing the meaning significantly. In general, elements of attitudes and general skills are included in the social competences aspect, while elements of specific skills and knowledge tend to be included in the specialist competences aspect.
Link of Diploma Supplement and transcript report:
Diploma supplement and transcrip report of Bachelor of Mathematics:
https://docs.google.com/document/d/1ovypVL0ehFVU0E2x9z5YIHUUJgshYxXU/edit#bookmark=id.gjdgxs
Diploma supplement and transcrip report of Mathematics Education:
https://drive.google.com/drive/folders/1oQfnyRytR3wo2aGvGtsG083FWPGGdy_9
Diploma supplement and transcrip report of Master of Mathematics Education:
https://docs.google.com/document/d/1vrO3QnEpTCnepPeJdjksqCB9FX3C1_es/edit#bookmark=id.gjdgxs
Diploma supplement and transcrip report of Bachelor of Physics:
https://drive.google.com/drive/folders/1MuECnbQZvmGpC0FKeS0WxJ6-ALghFyf8
Diploma supplement and transcrip report of Bachelor of Physics Education:
https://drive.google.com/drive/folders/10EM7c8mTcK1-yD72BSVYu85ovY7f6n7H
Diploma supplement and transcrip report of Master of Physics Education:
https://docs.google.com/document/d/1_oShcidmfUcaeXPSLnMTb-b6U65vh_2o/edit#bookmark=id.gjdgxs

Criterion 4.3. Relevant Rules

4.3.1.b. Responds:

Please find the additional explanation on 1.3.10.a response for the regulation of students with disabilities and special needs. Center of Learning Development, Learning Resources and Disabilities Services is responsible for making decisions and updating on regulation documents. Admission office is responsible for managing the student enrolment process and the study program is responsible for the study process.

5. Quality management: quality assessment and development

Criterion 5. Quality Management: Quality Assessment and Development

5.1.a. Responds:

Ba Mathematics Education

Bachelor of Mathematics Education orginised a FGD inviting alumni, stakeholders and industry partners on 12 June 2021. The following table contains feedbacks from alumni, stakeholders and industry partners who were invited to the FGD regarding Review of Graduate Profiles.

Tabel 5.1.a.1. The feedback

Aspect	Feedback from alumni, stakeholders and industry partners
Curriculum and learning	1. The ability of student to manage the class needs to be improved so that students do not only focus on the learning process which causes communication with students in the classroom to be less effective. 2. The study program is expected to be able to develop digital start-up-based knowledge so that it can encourage students' entrepreneurial skills. Apart from that, study program need increase collaborations with other institutions to provide opportunities for students to develop their competences through internships and other programs. 3. Students' Learning design skills and English proficiency (writing and speaking) need to be improved. English skills can be trained through regular presentations. Good English language skills can open up scholarship opportunities abroad. 4. Students need to be encouraged to improve their work, keeping updated with the current issues and research trends. 5. Students are accustomed to reading foreign references. 6. Students need to study various types of national and international curricula. 7. Student mastery in technology is needed in analyzing the curriculum. Students can be trained to develop an ICT-based curriculum for each subject so that it leads to an integrated education system.
Student activities	1. Some activities that students can do outside campus, apart from the education sector, is for examples entrepreneurship and community services 2. Students need to be encouraged to take part in student exchange programs. The study program can collaborate with institutions to provise financial support for the students. For example, looking for sponsors from UNJ partners who can finance students for student exchange abroad. As a follow-up, it is necessary to prepare a policy to empower students who are provided with assistance for student exchange. 3. Students need to be introduced to various activities to develop community-based programms such out empowering villages. For example, a "UNJ Mathematics Village" can be created in Jakarta so that it can become a community based activity to strengthen the local community. 4. Students' Communication skills (public speaking) need to be improved. Communication training for students can be carried out to support soft skills.

The feedback above has had an impact on improving the curriculum, including the following.
1. Project-based learning methods are more widely applied in learning in more than 50% of courses. The benefits of applying this method are that students become active learners, learning becomes more interactive, giving students the opportunity to manage their own activities or

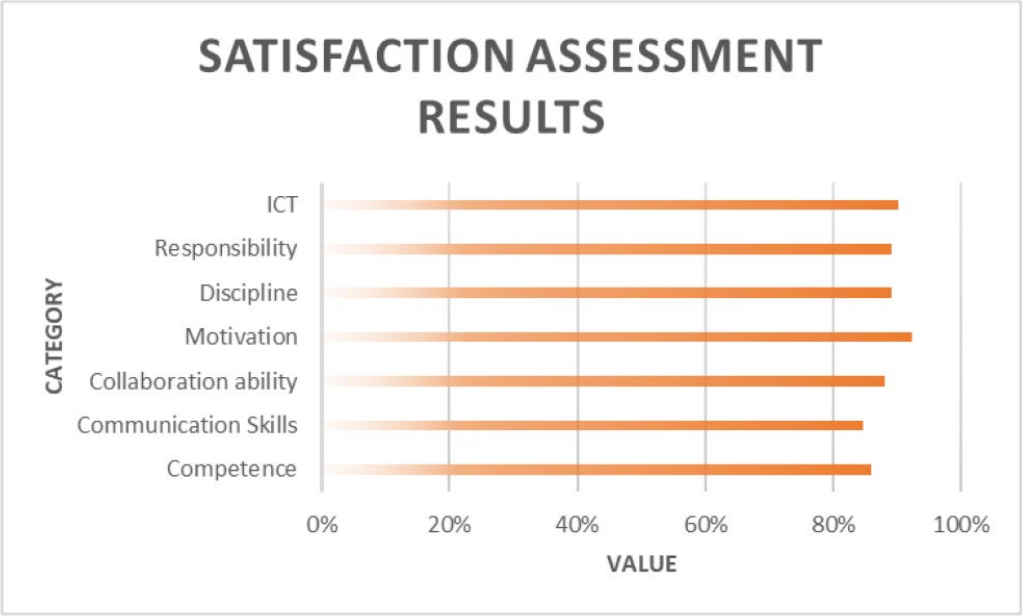
task completion activities so that students are trained to become independent, and can provide students with a deeper understanding of concepts or knowledge.
2. Periodic updates for module descriptions that are increasingly detailed and in-depth. This update includes aspects of study materials that are adapted to new knowledge and the job market, references used in learning, and the assessment system used.
3. The study program provides greater opportunities for practitioner lecturers to teach. Practitioner lecturers come to the campus environment bringing theoretical and practical knowledge. They have even applied the theoretical knowledge they have mastered directly so they can provide more in-depth explanations when teaching. Experience in the field makes practitioner lecturers focus on teaching various skills so that students can learn them as preparation for the world of work.
This statement has been responded to in 1.1.1.a., which states that the study programs invited industry representatives to give feedback on curriculum development. Furthermore, the feedback/recommendation is applied in the new curriculum. The following figures are the satisfaction survey result

Physics Study Program

The physics study program always do a satisfaction survey to the stakeholder at the end of the MBKM's internship program. The survey will help the study program to improve the curriculum. The survey mechanism is as follow.

1. The stakeholder input the satisfaction survey through the following link https://bit.ly/MBKM-Survey.
2. After that, the survey results are analysed by the study program, faculty and quality assurance. The analysis output are then applied to in to a new curriculum
3. **The follow-up actions from the meeting results may include training/workshop activities, improvements of the course syllabi (RPS), proposals for new courses, improvements to academic policies in the program study, and others.**

The Satisfaction Results



Partnership satisfaction report of MBKM is available at the following link:

https://bit.ly/Satisfaction_report_mbkm2023.

The Study Program development from 2021 to 2023.

Tabel 5.1.a.2. Feedback and follow-up of satisfaction survey

No	Year	Feedback from Industry Partners	Follow-up Actions by the Physics Study Program
1	2021	The study program needs to facilitate and enhance students' abilities in the following aspects: a. Students' instrumentation and ICT skills. b. Opportunities for students to learn outside the campus. c. Establishing a network of cooperation with industry partners for internship implementation. d. Data analysis skills. e. Expanding courses related to the development of knowledge and applications in the professional world.	The developments that have been implemented by the study program: a. Conducting the Instrumentation and Basic Control System Course training for fifth-semester students by inviting industrial partners b. Designing a curriculum that facilitates students' activities outside the campus for one semester through the Credit Transfer and Accumulation System (MBKM) scheme, and preparing the MBKM guidelines c. Initiating exploratory discussions for collaboration with the National Research and Innovation Agency (BRIN) and industry partners to implement the MBKM d. Initiating the preparation of the Measurement and Data Analysis course e. In the odd semester of the academic year 2021/2022, there is opening courses such as Industrial Physics, Introduction to Machine Learning in Physics, Digital Signal Analysis and Industrial Electronics.

2	2022	The study program needs to facilitate and enhance students' abilities in the following aspects: a. Data analysis skills. b. Implementation of Occupational Health and Safety (OHS) knowledge. c. Proficiency in computational and data science. d. Communication in English. e. Mastery of the laboratory equipment usage.	The developments that have been implemented by the study program: a. In the odd semester of the academic year 2022/2023, the Measurement and Data Analysis course is introduced for fifth-semester students. b. Conducting Occupational Health and Safety (OHS) training in the Physics laboratory and providing related videos on Occupational Health and Safety (OHS) on YouTube. c. Organizing Data Science training for fifth-semester students by inviting industry partners. d. Introducing the Communication Skills course for students. e. Hosting a workshop on mastering the laboratory equipment and introducing the elective course Laboratory Practice Assistant.

3	2023	The study program needs to facilitate and enhance students' abilities in the following aspects: a. Data Science and Programming Methods. b. Proficiency in the Laboratory Equipment. c. Laboratory Management. d. Communication in English. e. Mastery of material on international standards engineering curriculum. f. Skills in searching and reviewing papers, as well as conducting analysis. g. Involving industry practitioners in the lectures. h. Adding a specialization in geophysics and atmospheric physics.	The developments that have been implemented by the study program: a. Conducting Data Analytics training for students by inviting industry partners. b. Organizing a workshop on mastering the laboratory equipment and introducing the elective course Laboratory Practice Assistant. c. Scheduling to introduce the Physics Laboratory Management course in 2024. d. Deepening students' proficiency in communicating in English through the Communication Skills course. e. Adding content on Metrology and Calibration in industry and an introduction to ISO 9000 in the Measurement and Data Analysis course. f. Introducing the Scientific Communication course for seventh-semester students to train them in writing research results and citations. g. Involving industry experts in the Introduction to Information Technology and Computational Physics courses. h. Introducing elective courses in Rock Physics and Rock Magnetism, and further providing other elective courses related to geophysical and atmospheric sciences by collaborating with industry practitioners. The Physics Study Program also offers students the opportunity to take elective courses in these fields outside UNJ through the MBKM scheme.

Satisfaction Survey Result and analysis of Teaching Practise Program for Physics Education Study Program

To measure partners satisfaction of Teaching Skills Practices, several questions are used and designed to assess different aspects of the program. These questions can be structured as surveys or interviews, and generally cover aspects such as program effectiveness, communication, benefits and support provided. The results of the questionnaires and written interviews given to partners are shown below:

Respondent of 40 School Partners (Teaching Practise Program in 2021 and 2022)

The analysis of these survey results shows solutions for improvement and enhancement in the Teaching Skills Practice program. The following is an analysis of each feedback:

1. Effectiveness of Teaching Skills Practice Program

Evaluate how participants rated the overall effectiveness of the program in improving their teaching skills. Identify which aspects of the program were most appreciated and which need to be improved based on participants' responses.

1. Communication and Interaction in Teaching Skills Practice

Analyze how participants rated the quality of communication and interaction during the program, including between instructors and participants as well as between participants themselves. Determine if there is any feedback on ways to improve interactions or communication methods in the program.

1. Benefits of Teaching Skills Practice Program

Assess responses on the practical benefits participants perceived from attending the program. Identify whether the program met the learning objectives and professional development needs of the participants.

1. Resources and Materials in Teaching Skills Practice

Evaluate participants' opinions on the quality, relevance and usefulness of the materials and resources provided. Check if there are any recommendations for additional materials or other supporting resources.

1. Support and Facilities in the Practice of Teaching Skills

Analysis of how participants rated the support they received during the program, including technical, administrative, and academic assistance. Evaluation of the quality of facilities used, including technology, classrooms, and other equipment.

1. Overall Satisfaction with Practical Teaching Skills

Gather participants' overall impressions of the program, including whether their expectations were met. Identify areas of strength and aspects of the program that were most appreciated by participants. Also consider suggestions and comments for overall program improvement. For a more detailed and accurate analysis, you will need both quantitative (such as scores or ratings) and qualitative (such as written comments or feedback) data from participants. With this information, you can identify trends, understand participants' needs and preferences, and develop strategies to improve future programs.

Analysis of the interview results showed a number of suggestions and wishes from participants regarding the Teaching Skills Practice program.

Tabel 5.1.a.2. Feedback analysis

Aspects	Results
Classroom Practice Activities	partners want more intensive and relevant practical experience. Practical workshop sessions can provide hands-on opportunities to apply theory in real situations. It can also improve understanding of teaching concepts and skills.
Involving Guest Teachers or Field Practitioners	Partners want first-hand insights from field experts. The involvement of guest teachers or field practitioners can provide a more real-world, in-depth perspective on real-world challenges and opportunities. It can also motivate and inspire participants.

Online Forum or Platform to Share Experiences

To establish an online forum or platform demonstrates a desire to collaborate and share experiences. This can increase connectivity between participants, expand networks, and support the exchange of ideas and resources. Tailor Materials to Recent Developments in Education. Partners highlighted the importance of aligning materials with the latest developments in education. Updating materials in line with the latest developments can help participants become better prepared for changes and challenges in education. Overall, the interviews showed a push for practical learning, hands-on experience from field experts, collaboration among participants and compatibility with the latest developments in education. Integrating these suggestions can increase the effectiveness of the Teaching Skills Practice program and provide a more valuable experience for participants.

After evaluating the various aspects of Teaching Skills Practice, the possible follow- up actions are describe below:

1. On the Effectiveness of the Teaching Skills Practice Program:
    a. Conduct an in-depth analysis of participant feedback, including the strengths and weaknesses of the program.
    b. Develop a development plan to improve the less effective aspects.
    c. Conduct additional evaluations to monitor changes and improvements after improvements are implemented.
2. Communication and Interaction in Teaching Skills Practice
    a. Organize additional training sessions or workshops to improve participants' communication and interaction skills.
    b. Identify role models or mentors to model best practices in communication and interaction when teaching.
3. Benefits of the Teaching Skills Practice Program:
    a. Collect case studies or testimonials from participants who have experienced tangible benefits from the program and share them.
    b. Engage stakeholders in assessing the positive impact of the program on their teaching performance.
4. Resources and Materials for Teaching Skills Practice:

   a. Conduct an audit of resources and materials used in teaching skills practice.
   b. Identify resources that need to be upgraded or renewed and take steps to ensure adequate availability.

5. Support and Facilities for Teaching Skills Practice:
   a. Evaluate the level of support provided to participants during practice, and make improvements where necessary.
   b. Ensure facilities and infrastructure support the success of the practice, and if necessary, make changes or improvements.
6. Overall Satisfaction with Teaching Skills Practice:
   a. Conduct participant satisfaction surveys to obtain more detailed feedback.
   b. Identify areas where participants are satisfied and areas where improvement is needed.
   c. Analyse survey data and devise strategies to improve overall satisfaction levels.
7. Continuous Monitoring:
   a. Create an ongoing monitoring plan to ensure that the changes and improvements implemented are sustainable.
   b. Involve stakeholders in the evaluation process and listen to their feedback regularly.
8. Continuous Improvement and Innovation:
   a. Develop a continuous improvement cycle that involves updating the curriculum and learning methods according to the latest developments in education and technology.

F Summary: Expert recommendations (23.02.2024)

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

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

Requirements
For all study programs

A 1. (ASIIN 4.1) Prepare new module handbooks with module descriptions. The content, titles and description need to sufficiently present the topics addressed in the classroom.

A 2. (ASIIN 5) The students, who take part in surveys and questionnaires, are entitled to receive feedback on the results and the actions derived from these results.

Recommendation
For Ba Physics, Ba Physics Education and Ma Physics Education

A 3. (ASIIN 1.4) UNJ needs to ensure all students have the opportunity to study and therefore cannot exclude students from admission on the grounds of color-blindness.

Recommendations
For all study programs

E 1. (ASIIN 1.1, 1.3 & 5) It is recommended to increase the communication and collaboration with external stakeholders concerning the development of the study programs and their curricula.

E 2. (ASIIN 3.1) It is recommended to increase the number of international publications as well as the attendance of international conferences, especially in Mathematics Education.

E 3. (ASIIN 3.1) It is recommended to plan to systematically integrate the labschools into research projects.

Recommendations

For Ba Mathematics Education and Ma Mathematics Education

E 4. (ASIIN 1.3) It is recommend increasing the credit points allocated to elective courses.

Recommendation

For Ba Physics, Ba Physics Education and Ma Physics Education

E 5. (ASIIN 1.3) It is recommended to adequately represent theoretical physics in the curricula and the PLOs.

Recommendation

For Ba Physics, Ba Physics Education, Ba Mathematics, and Ba Mathematics Education

E 6. (ASIIN 2) It is recommended to reconsider the obligatory presentation of bachelor thesis at conferences.

G Comment of the Technical Committee

Technical Committee 12 – Mathematics (06.03.2024)

Assessment and analysis for the award of the ASIIN seal:

Although universities across Indonesia are generally well prepared and show a high dedication during the on-site visits, the submitted module handbooks often show room for improvement. The Technical Committee summarizes that the quality of the module handbook at the Universitas Negeri Jakarta is sufficient to proceed with the studies but requires further attention of the university to match the information given to the reality of the content of the classroom. The Technical Committee discusses especially the recommendation E1 to receive further insight on the motivation of the experts involved in the accreditation process. In addition, the Technical Committee questions to which degree it is necessary to recommend a higher attendance of international conferences and an increased number of international publication, particularly in the study program Mathematics Education. Mrs. Dreiseidler highlights that international research and collaboration is as crucial in the fields of education as it is in the fields of science. Based on all given additional explanation, the Technical Committee follows the decision of the experts without changes.

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

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

Requirements
For all study programs

A 1. (ASIIN 4.1) Prepare new module handbooks with module descriptions. The content, titles and description need to sufficiently present the topics addressed in the classroom.

A 2. (ASIIN 5) The students, who take part in surveys and questionnaires, are entitled to receive feedback on the results and the actions derived from these results.

Recommendations
For all study programs

E 1. (ASIIN 1.1, 1.3 & 5) It is recommended to increase the communication and collaboration with external stakeholders concerning the development of the study programs and their curricula.

E 2. (ASIIN 3.1) It is recommended to increase the number of international publications as well as the attendance of international conferences, especially in Mathematics Education.

E 3. (ASIIN 3.1) It is recommended to plan to systematically integrate the labschools into research projects.

Recommendations

For Ba Mathematics Education and Ma Mathematics Education

E 4. (ASIIN 1.3) It is recommend increasing the credit points allocated to elective courses.

Recommendation

For Ba Physics, Ba Physics Education, Ba Mathematics, and Ba Mathematics Education

E 6. (ASIIN 2) It is recommended to reconsider the obligatory presentation of bachelor thesis at conferences.

Technical Committee 13 – Physics (12.03.2024)

Assessment and analysis for the award of the ASIIN seal:

The Technical Committee discusses the procedures, in particular, E5. The recommended topics in theoretical physics, which (according to p. 39 of the report) the experts believe should be included in the curriculum of the degree programmes, seem to be excessive and not and not appropriate, especially, for Ba Physics Education programme. They wonder whether the recommendation is justified through the text in p. 39 and whether it applies to the Ba Physics, Ba Physics Education and Ma Physics programmes. They therefore ask

Ms. Vega to seek clarification from the responsible project manager. The responsible project manager explains that the text contained in p. 39 was the opinion of one of the experts following the university's statement and confirms that the recommendation applies to the three physics programmes. The TC conclude that the experts, for whom the recommendation was important, should provide a clearer explanation regarding E5 instead of the previous text on page 39. This will need to be adjusted or added to in the report. In addition, the TC proposes some editorial changes to E3.

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

Degree Programme	**ASIIN Seal**	**Maximum duration of accreditation**	**Subject-specific label**	**Maximum duration of accreditation**
Ba Physics	With requirements for one year	30.09.2029	–	-
Ba Physics Education	With requirements for one year	30.09.2029	–	-
Ma Physics Education	With requirements for one year	30.09.2029	–	-

Requirements
For all study programs

A 1. (ASIIN 4.1) Prepare new module handbooks with module descriptions. The content, titles and description need to sufficiently present the topics addressed in the classroom.

A 2. (ASIIN 5) The students, who take part in surveys and questionnaires, are entitled to receive feedback on the results and the actions derived from these results.

Recommendation
For Ba Physics, Ba Physics Education and Ma Physics Education

A 3. (ASIIN 1.4) UNJ needs to ensure all students have the opportunity to study and therefore cannot exclude students from admission on the grounds of color-blindness.

Recommendations
For all study programs

E 1. (ASIIN 1.1, 1.3 & 5) It is recommended to increase the communication and collaboration with external stakeholders concerning the development of the study programs and their curricula.

E 2. (ASIIN 3.1) It is recommended to increase the number of international publications as well as the attendance of international conferences, especially in Mathematics Education.

E 3. (ASIIN 3.1) It is recommended to systematically integrate the labschools into research projects.

Recommendation

For Ba Physics, Ba Physics Education and Ma Physics Education

E 5. (ASIIN 1.3) It is recommended to adequately represent theoretical physics in the curricula and the PLOs.

Recommendation

For Ba Physics, Ba Physics Education, Ba Mathematics, and Ba Mathematics Education

E 6. (ASIIN 2) It is recommended to reconsider the obligatory presentation of bachelor thesis at conferences.

H Decision of the Accreditation Commission (22.03.2024)

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

The accreditation commission discusses the procedure and follows the decision of the experts and the Technical Committees. It accepts the suggestions of the Technical Committee 13 in the recommendation E3. In addition, the Accreditation Commissions makes further changes in the recommendation E2 to clarify the content.

The Accreditation Commission decides to award the following seals:

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

Requirements
For all study programs

A 1. (ASIIN 4.1) Prepare new module handbooks with module descriptions. The content, titles and description need to sufficiently present the topics addressed in the classroom.

A 2. (ASIIN 5) The students, who take part in surveys and questionnaires, are entitled to receive feedback on the results and the actions derived from these results.

Recommendation
For Ba Physics, Ba Physics Education and Ma Physics Education

A 3. (ASIIN 1.4) UNJ needs to ensure all students have the opportunity to study and therefore cannot exclude students from admission on the grounds of color-blindness.

Recommendations
For all study programs

E 1. (ASIIN 1.1, 1.3 & 5) It is recommended to increase the communication and collaboration with external stakeholders concerning the development of the study programs and their curricula.

E 2. (ASIIN 3.1) It is recommended to increase the research output of the staff members on international level.

E 3. (ASIIN 3.1) It is recommended to systematically integrate the labschools into research projects.

Recommendations

For Ba Mathematics Education and Ma Mathematics Education

E 4. (ASIIN 1.3) It is recommend increasing the credit points allocated to elective courses.

Recommendation

For Ba Physics, Ba Physics Education and Ma Physics Education

E 5. (ASIIN 1.3) It is recommended to adequately represent theoretical physics in the curricula and the PLOs.

Recommendation

For Ba Physics, Ba Physics Education, Ba Mathematics, and Ba Mathematics Education

E 6. (ASIIN 2) It is recommended to reconsider the obligatory presentation of bachelor thesis at conferences.

Appendix: Programme Learning Outcomes and Curricula

According to diploma supplement, the following **objectives** shall be achieved by the bachelor degree program *Mathematics*:

1. Has a strong character in behaving in his environment, religious, loves the motherland, and has a social spirit and high concern for society and its environment.
2. Professional, able to create jobs and be able to compete in the world of work both at the national and Asian levels in various fields related to mathematics and its applications.
3. Able to make strategic decisions based on information and data analysis and provide solutions based on the results of mathematical studies.
4. Have national or Asian-level notion, ideas and scientific works in the field of mathematics that are meaningful, inspiring and beneficial to society.

UNJ presents the following PLOs for the bachelor program *Mathematics* in their SAR.

Area	Code	Program Learning Outcome
Social Competences	PLO 1	Uphold the values of humanity in accordance with religion, morals, and ethics.
	PLO 2	Internalize independence, perseverance, and entrepreneurship.
	PLO 3	Able to maintain and expand professional networks with supervisors, colleagues, and peers inside and outside the organization.
	PLO 4	Able to conduct self-evaluation on the team under their responsibility and to manage teaching and learning independently.
Specialist Competences	PLO 5	Able to make appropriate decisions to solve problems within their expertise, based on information and data analysis.
	PLO 6	Able to document, store, secure, and retrieve data to ensure validity and to prevent plagiarism.
	PLO 7	Master the theories of mathematical concepts, e.g. mathematical logic, discrete mathematics, algebra, analysis and geometry, probability, and statistics.

	PLO 8	Master the principles of mathematical modeling, linear programming, differential equations, dan numerical methods.
	PLO 9	Capable to conduct research independently or in groups that can be used to guide stakeholders in choosing diverse alternative solutions to problems in mathematics.
	PLO 10	Able to develop mathematical thinking, from procedural/computational understanding to advanced understanding, including exploration, logical reasoning, generalization, abstraction, and formal proving.
	PLO 11	Able to observe, recognize, formulate, and solve problems through a mathematical approach with or without software.

The following **curriculum** is presented:

Course code	Course Name	CP	ECTS	PLO										
				1	2	3	4	5	6	7	8	9	10	11
Semester 1														
3005-004-2	English	2	3			√	√							
0005-155-2	Pancasila	2	3	√	√									
0005-313-2	Indonesian Language	2	3			√	√							
3005-112-1	Olympism	1	1,5		√	√								
3125-201-2	Introductory of Fundamental Mathematics	2	3							√			√	
3125-202-2	Number Theory	2	3							√			√	
3125-203-4	Linear Algebra	4	6							√			√	
3125-501-3	Elementary Statistics	3	4,5					√		√				
3125-939-4	Differential Calculus	4	6							√	√			√
Total CP		**22**	**33**											

Semester 2													
0005-312-2	Religion	2	3	√		√							
0005-111-2	Civic Education	2	3	√	√								
3125-204-3	Linear Programming	3	4,5					√			√	√	√
3125-601-3	Programming Algorithm	3	4,5					√			√		√	√
3125-604-3	Analytical Geometry	3	4,5					√		√				√
3125-901-3	Discrete Mathematics	3	4,5					√		√			√	√
3125-940-4	Integral Calculus	4	6							√				√
0005-318-2	Pondation of Education	2	3	√	√	√	√							
	Total CP	**22**	**33**											

Semester 3													
3125-956-2	Philosophy of Science	2	3	√		√	√						
3125-004-2	English for	2	3			√							

Course code	**Course Name**	**CP**	**ECTS**	**PLO**										
				1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
	Mathematics													
3125-602-3	Numerical Methods	3	4,5					√		√	√	√	√	√
3125-941-4	Multivariable Calculus	4	6							√			√	√
3125-942-3	Elementary Differential Equations	3	4,5							√	√	√	√	√
0005-319-2	Big Data and Programming	2	3					√	√	√	√			
	Elective Course:	3	4,5											
3125-003-2	*Graph Theory*	*2*	*3*							√			√	
3125-906-3	*Data Structure*	*3*	*4,5*					√	√	√				
3125-804-3	*Financial Mathematics*	*3*	*4,5*							√			√	√
3125-301-3	*Transformation Geometry*	*3*	*4,5*					√		√			√	√
	Total CP	**19**	**28,5**											

Semester 4															
3125-401-3	Real Analysis I	3	4,5							√			√		
3125-403-3	Functions of a Complex Variable	3	4,5							√			√		
3125-503-3	Mathematical Statistics I	3	4,5							√			√		
3125-938-3	Entrepreneurship	3	4,5		√										
3125-950-3	Partial Differential Equations	3	4,5				√				√			√	
'00053202	Logic and Reasoning	2	3							√			√		
	Elective Courses:	3	4,5												
3125-007-3	*Dynamical System*	*3*	*4,5*								√		√	√	
3125-706-3	*Time Series Analysis*	*3*	*4,5*					√		√				√	
3125-947-3	*Design and Analytical Algorithm*	*3*	*4,5*					√			√		√		
3125-932-3	*Mathematical Economics*	*3*	*4,5*							√	√			√	
31250133	*Calculus of Variations*	*3*	*4,5*							√			√	√	
	Total CP	**20**	**30**												

Semester 5															
3125-053-2	Research Methodology	2	3						√			√			√
3125-205-4	Abstract Algebra	4	6							√			√		
3125-402-3	Real Analysis II	3	4,5							√			√		
3125-504-3	Mathematical Statistics I	3	4,5							√					√
	Elective Courses:	6	9												
31250113	*Theory of Investment and Asset*	*3*	*4,5*					√			√				

Course code	**Course Name**	**CP**	**ECTS**	**PLO**										
				1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
31250123	*Optimum Control Theory*	*3*	*4,5*									√		√
31257013	*Sampling Theory*	*3*	*4,5*						√	√		√		
31250143	*Parallel Computating*	*3*	*4,5*						√	√				
	Total CP	**18**	**27**											

Semester 6														
3125-051-2	Mathematics Seminar	2	3			√	√	√	√	√		√	√	√
3125-505-3	Stochastic Process	3	4,5					√		√			√	√
3125-933-3	Operation Research	3	4,5					√					√	√
3125-946-3	Mathematical Modelling	3	4,5								√	√		
3125-954-2	Business Communication	2	3			√		√						
	Elective Courses:	6	9											
3125-704-2	*Non Parametric Statistics*	*2*	*3*							√				√
3125-718-3	*Probability Theory*	*3*	*4,5*							√				
3125-808-3	*Insurance Mathematics*	*3*	*4,5*					√		√		√		√
3125-404-3	*Introduction to Topology*	*3*	*4,5*							√				√
	Total CP	**19**	**28,5**											

Semester 7 MBKM														
3125-005-6	Field Working Practical	6	9		√	√	√		√					√
3125-957-2	Seminar of Pre Undergraduate Thesis	2	3		√	√		√	√					
	Elective Courses:	12	18											
0005-300-2	*Field Working Lecture*	*2*	*3*		√		√					√		
3125-405-3	*Measure Theory*	*3*	*4,5*									√		√
3125-951-3	*Risk Theory*	*3*	*4,5*					√		√				
31250003	*Introduction to Functional Analysis*	*3*	*4,5*							√			√	
3125-015-3	*Introduction to General Linier Model*	*3*	*4,5*							√	√			√
	Total CP	**20**	**30**											

Semester 8														
3005-402-4	Undergraduate Thesis	4	6		√	√		√	√			√		√
	Total CP	**4**	6											

***Note:** the green shading means elective courses

According to webpage of the study program, the following **objectives** shall be achieved in the bachelor degree program *Mathematics Education*:

1. Having professional, pedagogical, social, and personality competencies, religious, virtuous, and adequate to compete at the Asia level.
2. Publish a research and scientific works to develop innovative, creative, applicable mathematics education, and provide solutions to mathematics education problems.

UNJ presents the following PLOs for the bachelor program *Mathematics Education* in their webpage.

Area	Code	Program Learning Outcome
Social Competences	PLO 1	Uphold human values accordance with religion, morals, and ethics.
	PLO 2	Internalizing the spirit of independence, perseverance, and entrepreneurship.
	PLO 3	Able to understand themselves as an educator.
	PLO 4	Able to work in a team, social awareness, and concern for community and environment.
Specialist Competences	PLO 5	Mastering the theoretical concept of mathematics, including mathematical logic, discrete mathematics, algebra, analysis and geometry, probability, and statistics.
	PLO 6	Mastering in modeling mathematical concepts, linear programs, differential equations, dan numerical methods.
	PLO 7	Able to conduct, analyze, and apply research outcomes to improve the mathematics learning process.
	PLO 8	Able to plan, implement, and evaluate learning in learning mathematics.
	PLO 9	Able to employ various learning resources and mathematics learning media.
	PLO 10	Able to solve problems in real situations based on knowledge of mathematics education.

The following **curriculum** is presented:

Course Code	Course Name	CP	ECTS	PLO									
				1	2	3	4	5	6	7	8	9	10
Semester 1													
0005-111-2	Pancasila	2	3	√	√	√	√						
3005-006-2	Indonesian Language	2	3	√	√	√	√						
0005-307-4	Educational Foundation	3	4.5	√		√							
3005-112-1	Olympism	1	1.5	√	√		√						
3115-204-3	Differential Calculus	3	4.5					√	√				
3115-036-2	Introduction of Basic Mathematics	2	3					√	√				
3115-038-3	Basic Statistics	3	4.5					√	√	√			
3115-071-3	Linear Algebra	3	4.5					√	√				
	Total CP	**19**	**28.5**										
Semester 2													
0005-312-3	Religion	2	3	√		√							
0005-321-2	Educational Science	2	3	√		√							
0005-111-3	Civic Education	2	3	√	√	√	√						
0005-210-2	Student Development	2	3	√		√							
3115-205-3	Integral Calculus	3	4.5					√	√				
3005-002-2	Philosophy of Mathematics and Natural Sciences	2	3	√		√	√						
3115-044-3	Mathematical Statistics I	3	4.5					√	√				
3115-067-2	English for Mathematics I	2	3					√	√				
3115-211-3	Programming Algorithm	3	4.5					√	√				
	Total CP	**21**	**31.5**										
Semester 3													
0005-322-2	Introduction to Programming and Big Data	2	3					√	√				√
0005-214-4	Learning Theory	2	3	√		√							
3115-030-2	Theory of Numbers	2	3					√	√				
3115-073-2	Euclid Geometry	2	3					√					
3115-211-3	Complex Variable Functions	3	4.5					√					
3115-206-3	Multivariable Calculus	3	4.5					√	√				
3115-082-2	English for Mathematics II	2	3					√	√				
3115-212-3	Introduction to Computer Animation	3	4.5					√				√	
3115-063-2	Learning on Mathematics for Elementary School	2	3			√					√	√	√
	Total CP	**21**	**31.5**										

Semester 4													
0005-320-2	Logic and Scientific Reasoning	2	3					√		√	√		
3115-207-3	Elementary Differential Equation	3	4.5						√				
3115-051-3	Numerical Methods	3	4.5					√		√			
3115-011-2	Space Geometry	2	3					√					
3115-209-3	Analytical Geometry	3	4.5					√					
3115-048-3	Real Analysis I	3	4.5					√					
3115-045-3	Mathematical Statistics II	3	4.5					√	√				
3115-064-2	Learning on Mathematics for Junior High School	2	3			√					√	√	√
	Total CP	**21**	**31.5**										
Semester 5													
3115-208-3	Advanced Differential Equation	3	4.5						√				
3115-043-3	Transformation Geometry	3	4.5					√					
3115-049-3	Real Analysis II	3	4.5					√					
3115-053-3	Discrete Mathematics	3	4.5					√					
3115-010-2	Mathematics Workshop	2	3		√	√				√		√	√
3115-075-2	Learning on Mathematics for Senior High School	2	3			√					√	√	√
3005-202-3	Planning, Management and Evaluation of Teaching	3	4.5			√					√	√	√
	Elective Course(s)	2	7.5										
	Total CP	**21**	**31.5**										
Semester 6													
3115-031-3	Abstract Algebra	3	4.5					√					
3115-035-3	Linear Programming	3	4.5							√			
3115-214-3	ICT Based Teaching and Learning in Mathematics	3	4.5			√					√	√	√
3115-222-2	Educational Research Methods	2	3			√				√			
3115-210-3	Capita Selecta of Mathematics	3	4.5			√		√	√				
3115-237-2	Microteaching	2	3			√					√	√	
	Elective Course(s)	2	7.5										
	Total CP	**18**	**27**										

Semester 7													
3005-207-2	Pre-Thesis Seminar	2	3	√						√			√
KM-00016	Practice Teaching Skills	6	9	√	√	√	√			√	√	√	√
	Elective Courses (MBKM)	12	18										
	Total CP	**20**	**30**										
Semester 8													
3005-402-4	Thesis	4	6	√	√	√	√			√	√	√	√
	Total CP	**4**	**6**										

Elective Courses (MBKM)												
KM-00934	Designing Learning Kit	4	6		√	√				√		√	√
KM-00944	Designing Learning Media	4	6		√	√				√		√	√
KM-00954	Designing Teaching and Learning Instruments	4	6		√	√				√		√	√

Elective Courses

Course Code	Course Name	CP	ECTS	PLO									
				1	2	3	4	5	6	7	8	9	10
3115-025-2	Descriptive Geometry	2	3					√					
3115-233-3	Nonparametric Statistics	2	3					√	√	√			√
3115-223-3	Operational Research	3	4.5							√			
3115-232-3	Experimental Design	3	4.5					√	√	√			√
3115-213-3	Regression Analysis	3	4.5					√	√	√			√
3115-215-3	Multivariate Analysis	3	4.5					√	√	√			√
3115-946-3	Mathematical Modelling	3	4.5						√				
3005-004-2	English	2	3	√	√	√	√						
3115-017-2	History of Mathematics	2	3	√			√	√	√				
3115-216-3	Entrepreneurship	3	4.5	√	√		√						√
3115-054-2	Seminar on Mathematics	2	3	√			√			√			
0005-300-2	Community Service Programme	2	3	√	√		√						√

According to webpage of the study program, the following **objectives** shall be achieved in the master degree program *Mathematics Education*:

1. to produce graduates who are well versed in the theory of mathematics education and can practice it as professional educators at various levels and related fields.
2. to produce graduates who can research to answer various current problems, new ideas, theories, and innovations in mathematics education.

UNJ presents the following PLOs for the master program *Mathematics Education* in their webpage.

Area	Code	Program Learning Outcome
Social Competences	PLO 1	Internalize and implement the values of Divinity, Humanity, Diversity and Justice.
Specialist Competences	PLO 2	Understanding and analyzing pedagogic concepts and theories of learning mathematics comprehensively.
	PLO 3	Develop creative and innovative mathematics learning designs.
	PLO 4	Mastering and applying various assessment and evaluation techniques in the process of mathematics education.
	PLO 5	Mastering, analyzing, and proving concepts, principles, procedures, and theorems in mathematics.
	PLO 6	Apply concepts, principles, procedures, and theorems to solve mathematics problems.
	PLO 7	Conduct research with the correct methodology to solve problems and create innovations in mathematics learning.
	PLO 8	Develop and apply Information Technology and Communication (ICT) in the management of learning organizations.

The following **curriculum** is presented:

Course code	Course Name	CP	ECTS	PLO							
				1	2	3	4	5	6	7	8
Semester 1											
30061052	The Philosophy of Science	2	5,2	v							
30061033	Educational Research Methodology	3	7,8	v			v		v	v	
31360022	Abstract Algebra	2	5,2					v			
31360012	Real Analysis	2	5,2					v			
31362093	Mathematical Statistics	3	7,8				v	v			
31361012	New Orientation in Education	2	5,2	v	v						
	Total CP	**15**	**39**								

Semester 2											
30062013	Educational Statistics	3	7,8				v		v	v	
31362032	Mathematics Teaching and Learning Designs	3	7,8		v	v					
31362052	Evaluation in Mathematics Teaching and Learning	2	5,2				v				
31363082	Advanced Real Analysis	2	5,2					v			
31363092	Advanced Abstract Algebra	2	5,2					v			
31362013	Development and Problems in Mathematics Education	3	7,8		v						
	Total CP	**14**	36,4								

Semester 3											
31362062	Mathematical Modeling *	2	5,2						v		
31363022	Discrete Mathematics *	2	5,2						v		
31363032	Media and Information and Communication Technology (ICT) in Mathematics Teaching and Learning	2	5,2			v					v
31362022	Realistic Mathematics Teaching and Learning *)	2	5,2		v	v					
31363012	Mathematical Higher Order Thinking *	2	5,2		v						
31362042	English for Mathematics Teaching and Learning*)	2	5,2								v
00000012	Leadership in Learning Organisations *)	3	7,8								v
31363052	Thesis Seminar	2	5,2	v	v	v				v	
31360032	Development of research Instrument *)	2	5,2							v	
	Total CP	**12**	20,8								

Semester 4											
30060016	Thesis	6	15,6	v	v	v				v	
	Total CP	**8**	**20,8**								

*) elective courses

According to webpage of the study program, the following **objectives** shall be achieved in the bachelor degree program *Physics*:

1. Master basic concepts and methodology of physics and apply it to a broader field by utilizing science and technology developments to discover solutions according to their field of work.
2. Expand their knowledge through further study of formal and informal higher education.
3. Collaborate actively and effectively in a team, communicate ideas, and have managerial skills on related fields.
4. Have creative, innovative, and adaptive personality towards the advancement of science and technology according to their field of work

UNJ presents the following PLOs for the bachelor program *Physics* in their webpage.

Area	Code	Program Learning Outcome
Social Competences	PLO 1	Demonstrate a religious manner, uphold values of humanity and nationalism, and internalize the value of self-reliance, discipline, responsible, critical thinking, innovative, communicative, and collaborative in solving different problems.
	PLO 2	They are competent to work in team and independent, documented and analyse data to discover scientific assertions that correspond with standard scientific principles, communicate verbally and in writing, publish the paper, as well as super-vise and assess to establish accurate solutions.
Specialist Competences	PLO 3	They are advanced knowledge of relevant specialized classical theoretical physics and modern physics using mathematical and computational concepts.
	PLO 4	They are qualified to accomplish theoretical analysis by fundamental principles of physics and mathematical concepts to generate models or simulations that correspond to hypotheses.
	PLO 5	They are capable to demonstrate by involve the fundamental principles of physical measurement and scientific methodology to interpret data and formulate physics phenomena.
	PLO 6	They have acquired instrumentation and computational expertise in physics, synthesize and characterize material to expand it to another field.

	PLO 7	They have advanced their knowledge in technology that using physics principle and employ physical concept to applied to relevant subject by utilize the development of science and technology in accordance with the field of work.
	PLO 8	They are competent to improve their knowledge and continue study to a higher level.

The following curriculum is presented:

Smt	Course code	Course Name	CP	ECTS	PLO							
					1	2	3	4	5	6	7	8
I	00051142	Indonesian	2	3	v	v						
	00051122	Pancasila	2	3	v							
	33250123	General Chemistry	3	4,5		v						
	30050022	Philosophy of Natural Sciences	2	3		v						
	32250671	Olympism	1	1,5	v							
	32250683	Calculus I	3	4,5			v					
	32251013	Basic Physics I	3	4,5			v					
	32251021	Basic Physics Practicum I	1	1,5	v	v			v			
	32250602	English for Physics	2	3	v	v					v	
		Total CP of Semester I	19	28,5								
II	00052033	Religion	2	3	v							
	00053212	Education Overview	2	3	v							
	00031062	Civic Education	2	3	v							
	32250703	Calculus II	3	4,5			v					
	34150012	General Biology	2	3		v						
	32251033	Basic Physics II	3	4,5			v					
	32251041	Basic Physics Practicum II	1	1,5	v	v			v			
	32252012	Introduction to Information Technology	2	3			V				v	
	32250112	Industrial Physics	2	3			v				v	
		Total CP of Semester II	19	28,5								

III	32254034	Mathematical Physics I	4	6			v	v				
	32253014	Electronics	4	6			v	v		v		
	32255014	Classical Mechanics	4	6			v	v				
	32253021	Electronics Practicum	1	1,5	v	v		v	v			
	32252022	Computer Programming	2	3			v	v				
	32252031	Computer Programming Practicum	1	1,5		v	v	v	v			
	32256013	Modern Physics	3	4,5			v	v				
	32256021	Modern Physics Practicum	1	1,5	v	v		v	v			
		Total CP of Semester III	20	30								
IV	32254044	Mathematical Physics II	4	6			v	v				
	32255044	Electricity and Magnetism	4	6			v	v				
	32252043	Computational Physics	3	4,5			v	v				
	32252051	Computational Physics Practicum	1	1,5		v	v	v	v			
	32250052	Digital Electronics	2	3			v			v		
	32253041	Digital Electronics Practicum	1	1,5		v			v			
	32255034	Waves	4	6			v	v				
		Total CP of Semester IV	19	28,5								
V	32254053	Statistics	2	3			v	v				
	32256073	Thermodynamics	3	4,5			v	v				
	32256033	Quantum Physics	3	4,5			v	v				v
	32250014	Solid Sate Physics	4	6			v	v				v
	32250242	Measurement and Data Analysis	2	3		v	v	v	v			
	32256122	Experimental Physics	2	3		v	v	v	v			
	00053202	Logical and Scientific Reasoning	2	3	v	v						
	00053202	Big Data and Programming	2	3	v	v						
		Total CP of Semester V	20	30								
VI	3225xxxx	Internship	6	9	v	v			v		v	
		Planning and Design Activity	2	3	v	v					v	
		Reports and publications	3	4,5	v	v					v	
		Physics Workshop	3	4,5			v		v			
		Special study 1	3	4,5			v	v			v	
		Special study 2	3	4,5			v	v			v	
		Total CP of Semester VI	20	30								

VII	32256063	Introduction to Nuclear Physics	3	4,5			v	v				v
	32256043	Statistical Physics	3	4,5			v	v				v
	32250152	Research Methodology in Physics	2	3		v			v			v
	30052072	Undergraduate Pre-Thesis Seminar	2	3	v	v	v	v		v	v	
	32250752	Scientific Communication	2	3	v	v	v	v				
	3225xxxx	Elective Courses	8	12								
		Total CP of Semester VII	20	30								
VIII	30054024	Undergraduate Thesis	4	6	v	v	v	v	v	v	v	
	3225xxxx	Elective Courses	3	4,5								
		Total CP of Semester VIII	7	12.00								
		Total CP of Semester I - VIII	144	216,00								
		Elective Courses										
	32256143	Physics of Magnetic Materials	3	3			v	v		v	v	v
	32256153	Physics and Semiconductor Technology	3	3			v	v		v	v	v
	32256183	Physics of Ceramics	3	3			v	v		v	v	v
	32256213	X-Ray Diffraction	3	3			v	v		v	v	v
	32256222	Mechanical Properties of Materials	2	2			v	v		v	v	v

Smt	Course code	Course Name	CP	ECTS	PLO							
					1	2	3	4	5	6	7	8
	32256342	Physics of Composite	2	2			v	v		v	v	v
	32256173	Physics of Metal	3	3			v	v		v	v	v
	32256253	Physics of Material	3	3			v	v		v	v	v
	32256232	Electrical Properties of Materials	2	2			v	v		v	v	v
	32256163	Physics of Polymer	3	3			v	v		v	v	v
	32258013	Capita Selecta on Computational Physics	3	3			v	v		v	v	v
	32258022	Physics Simulation	2	2			v	v		v	v	v
	32257052	C / C ++ Programming Language	2	2			v	v		v	v	v
	32250763	Introduction to Machine Learning in Physics	3	3			v	v		v	v	v
	32250773	Introduction to Intelligent System Physics	3	3			v	v		v	v	v
	32250693	Digital Signal Analysis	3	3			v	v		v	v	v
	32257063	Digital Image Processing	3	3			v	v		v	v	v
	32257033	Sensor Technology	3	3			v	v	v	v	v	v
	32257022	Control System	2	2				v		v	v	v
	32257013	Microprocessors and Interfaces	3	3				v	v	v	v	v
	32250702	Ultrasonic: theory and application	2	2			v	v		v	v	v
	32250712	Basic Biomedical Instrumentation	2	2				v		v	v	v
	32250722	Industrial Electronics	2	2				v		v	v	v
	32250002	Introduction to Radiation Physics	2	2				v		v	v	v
	32250272	Materials for sensors	2	2				v		v	v	v
	32250262	Advanced Electronics	2	2			v	v		v	v	v
	32256073	Electromagnetic Field Theory	3	3			v	v				v
	32256083	Quantum Mechanics	3	3			v	v				v
	32250033	Special Study 3	3	3			v	v				v
	32250322	Laboratory Practice Assistant	2	2	v	v	v	v	v			
	32259012	Environmental Physics	2	2				v			v	
	32259032	Rock Physics	2	2			v	v			v	
	32256103	Laser and Modern Optics	3	3			v	v			v	v
	32256242	Solar Cell Technology	2	2			v	v			v	
	32259112	Condensed Matter Theory	2	2			v	v			v	v
	32250662	Entrepreneurship	2	2	v	v						
	32259072	Rock Magnetism	2	2			v	v			v	v

According to webpage of the study program, the following **objectives** shall be achieved in the bachelor degree program *Physics Education*:

1. Have excellent pedagogical knowledge, with cognitive, interpersonal, and intrapersonal competencies and capable to solve problems in physics teaching and learning and its applications by utilizing ICT.
2. Master theoretical and practical physics concepts as well as pedagogical concepts in the field of physics education.
3. Work as an educator who is professional, qualified, competitive, and innovative in science and physics teaching and learning through mastery of theoretical concepts and practical applications, capable to analyse, research, and involve learning models with ICT-based learning tools that appropriate for physics and science education.
4. Pursue a higher level of education in Indonesia or abroad to develop science, technology, and expertise in physics education and its applications.
5. Have scientific knowledge, skills, entrepreneurship, sportsmanship honesty, and integrity to develop themselves in society as edutechnopreneur practitioners.
6. Have expertise as a research assistant in Physics Education with article published in national or international journals.

UNJ presents the following PLOs for the bachelor program *Physics Education* in their webpage.

Area	Code	Program Learning Outcome
Social Competences	PLO 1	Demonstrate a professional attitude in work based on religious values, human values and culture.
	PLO 2	Demonstrate an attitude of critical thinking, innovative, collaborative and communicative in solving problems in the field of physics education
Specialist Competences	PLO 3	Able to comprehend concepts in classical and modern physics.
	PLO 4	Involve mathematical, computational, and measurement protocols in order to solve the physics problem.
	PLO 5	Capable to implement pedagogical content knowledge technology (TPACK) in advancing, implementing and evaluating physics learning.
	PLO 6	Capable to utilize fundamental principle and applied physics, identify problem, discover alternative solutions based on theory

		and research, constructed and implemented in physics education research.
	PLO 7	Capable of conducting education, management of physics laboratory, and practicum in accordance with the HSE (Health Safety and Environment) principle.
	PLO 8	Capable to enhancing another related competence with applied physics.

The following curriculum is presented:

Course Code	Course Name	CP	ECTS	PLO							
				1	2	3	4	5	6	7	8
Semester 1											
1	Basic Physics I	3	4.5			V					
2	Basic Physics Practicum I	1	1,5			V					
3	Calculus I	3	4.5				V				
4	General Chemistry	3	4.5			V					
5	Indonesian Language	2	3		V						
6	Education Overview	2	3	V							
7	Pancasila	2	3	V							
8	Introduction to Information Technology	2	3				V				
9	Olympism	1	1.5		V						
	Total CP	**19**	**27**								
Semester 2											
1	Basic Physics II	3	4.5			V					
2	Basic Physics Practicum II	1				V					
3	Calculus II	3	4.5				V				
4	General Biology	2	3			V					
5	Student Development	2	3					V			
6	Civic Education	2	3	V							
7	Religion	2	3	V							
8	Logic and Reasoning	2	3		V						
9	Science learning strategy	2	3					V			
	Total CP	**19**	**27**								

Semester 3											
1	Mathematical Physics I	4	6				V				
2	Electronics	4	6			V					
3	Electronics Practicum	1				V					
4	Classical Mechanics	4	6			V					
5	Modern Physics	3	4.5			V					
6	Modern Physics Practicum	1				V					
7	Big Data and Programing	2	3				V				
	Total CP	**19**	**27**								

Semester 4											
1	Mathematical Physics II	4	6				V				
2	Wave	4	6			V					
3	Electricity and Magnetism	4	6			V					
4	Computational Physics	3	4.5				V				
5	Computational Physics Practicum	1					V				
6	Foundation of education	3	4.5					V			
	Total CP	**19**	**27**								

Semester 5											
1	Quantum Physics	3	4.5				V				
2	Thermodynamics	3	4.5				V				
3	Introduction to Solid State Physics	3	4.5				V				
4	Learning assessment	2	3					V			
5	Curriculum analysis	2	3					V			
6	Development of Physics Learning Media	2	3					V			
7	Learning theory and learning	2	3					V			
8	Elective Course	2	3								
	Total CP	**19**	**27**								

Semester 6											
1	Research Method for Education	3	4.5						V		
2	Teaching skills	2	3					V			
3	Statistics for Research	3	4.5						V		
4	Introduction to Nuclear Physics	3	4.5			V					
5	English for Teaching	2	3	V							
6	Science learning design	2	3					V			
7	Teaching Materials Development	2	3					V			
8	Elective Course	2	3								
	Total CP	**19**	**28.5**								

Semester 7											
1	Teaching Experience	6						V	V	V	
2	Implementing Learning Media Development in Schools	4	6					V			V
3	Implementation of the development of teaching materials in schools	4	6					V			V
4	Implementation of instrument development in schools	4	6					V			V
5	Undergraduate Pre-Thesis Seminar	2					V		V	V	
	Total CP	**20**									

Semester 8											
1	Undergraduate Thesis	4		V	V	V	V	V	V	V	V
2	Elective Course	6	9								
	Total CP	**10**									
	TOTAL CREDITS	**145**									

Elective Courses											
1	Special topics in school physics	2	3					V			V
2	Laboratory management	2	3							V	V
3	ICT-based learning of Physics	2	3					V			V
4	Earth and space physics	2	3			V					V
5	Environmental Physics Education	2	3			V					V
6	Environmental Studies in Physics Learning	2	3					V			V
7	Entrepreneurship	2	3		V						V
8	Statistical physics	3	4.5			V					V
9	Solid matter physics	3	4.5			V					V
10	Quantum mechanics	3	4.5			V					V
11	Electromagnetic field theory	3	4.5			V					V
12	Digital electronics	3	4.5			V	V				V
13	Digital electronics Practicum	2				V	V				V
14	Sensor technology	2	3			V	V				V

According to webpage of the study program, the following **objectives** shall be achieved in the master degree program *Physics Education*:

1. Producing graduates with advanced knowledge in science, innovation and technology in the field of physics education and their applications so that they are able to develop themselves professionally.
2. Producing graduates who are able to create innovative and tested work through developing knowledge in the field of Physics education.

3. Producing graduates who are able to conduct quality research, are recognized nationally and internationally, and are beneficial to society and science.

UNJ presents the following PLOs for the master program *Physics Education* in their webpage.

Area	Code	Program Learning Outcome
Social Competences	PLO 1	Able to develop logical, critical, systematic and creative thinking through scientific research in the field of physics education.
Specialist Competences	PLO 2	Master advanced knowledge of classical physics and modern physics.
	PLO 3	Able to design innovative physics learning in accordance with curriculum demands by using appropriate evaluation and assessment techniques.
	PLO 4	Able to develop learning aids by utilizing advanced information technology and the student environment.
	PLO 5	Able to propose various alternative solutions to physics education problems with an inter- and multidisciplinary approach.
	PLO 6	Able to design scientific research to solve physics education problems.
	PLO 7	Able to carry out scientific research in the field of physics education based on scientific methodology, logical, critical, systematic and creative thinking.
	PLO 8	Able to produce scientific articles that are novel, and publish them in accredited national scientific journals, international seminar proceedings, or international journals.

The following curriculum is presented:

Course Code	Course Name	CP	ECTS	PLO							
				1	2	3	4	5	6	7	8
30061052	Philosophy of Science	2	5,2	v	v		v				
30061033	Educational Research Methodology	3	7,8		v					v	v
32363162	Physics Learning Curriculum and Design	2	5,2		v			v			
32363172	Physics Learning Innovation	2	5,2		v	v					v
32363202	Advanced Mechanics	2	5,2		v		v				
32363212	Advanced Electrodynamics	2	5,2		v		v				
	Total CP	**13**	**33,8**								

Semester 2

30062013	Education Statistics	3	7,8		v					v	v
32363182	Physics Education Research Study	2	5,2		v	v			v	v	v
32363192	Physics Learning Assessment	2	5,2		V					v	v
32363113	IT and Physics Learning Multimedia Development	3	7,8		v	v		v	v		v
32363152	Advanced Modern Physics	2	5,2		v		v				
	Total CP	**12**	**31,2**								

Semester 3

32363112	Scientific Article Writing Techniques*	2	5,2		v	v				v	v
32363063	Electronic Instrumentation for Physics Education*	3	7,8		v						v
32363232	Computer Simulation for Physics Learning*	2	5,2		v						v

32363242	Big Data in Physics Education*	2	5,2		v						v
32363252	Advanced Thermodynamics*	2	5,2		v		v				
32363142	Integrated Science and Environment*	2	5,2	v	v					v	
32363122	English for Scientific Communication*	2	5,2		v					v	
	Total CP	**6**	15,6								
30084024	Thesis	6	15,6	v	v	v	v	v	v	v	v
30063032	Thesis Seminar	2	5,2		v	v	v	v	v	v	
	Total CP	**8**	**20,8**								
	TOTAL CREDITS	**39**	**101,4**								

Table 1.38 List of Elective Courses of Master of Physics Education Study Programme

No.	Course Codes	Courses	CP	ECTS	Semester
1	32363112	Scientific Article Writing Techniques*	2	5,2	Available in every semester
2	32363063	Electronic Instrumentation for Physics Education*	3	7,8	
3	32363232	Computer Simulation for Physics Learning*	2	5,2	
4	32363242	Big data in Physics Education*	2	5,2	
5	32363252	Advanced Thermodynamics*	2	5,2	
6	32363142	Integrated Science and Environment*	2	5,2	
7	32363122	English for Scientific Communication*	2	5,2	