CURRICULUM
Outcome Based Education (OBE)

PHYSICS STUDY PROGRAM
FACULTY OF TEACHER TRAINING AND EDUCATION
UNIVERSITY OF BENGKULU

DRAFTING TEAM

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FOREWORD

Praise be to Allah SWT for the abundance of His blessings and gifts, so that the Bengkulu University Physics Education Study Program Curriculum Development Team has completed the Outcome Based Education (OBE) Curriculum with the implementation of Merdeka Learning – Merdeka Campus (MBKM). As a follow-up to the enactment of the Higher Education Law Number 12 of 2012 article 29 concerning the Indonesian National Qualifications Framework (KKNI); Government Regulation Number 8 of 2012, concerning the Indonesian National Qualifications Framework Level 6; Permendikbud No. 49 of 2014 concerning National Standards for Higher Education; Mendristekdikti Regulation No. 44 of 2015 concerning National Standards for Higher Education; Government Regulation No. 17 of 2010 article 97 paragraph 1 regarding competency-based curriculum development by universities themselves. In early 2020 the Ministry of Education and Culture implemented a new policy in the field of higher education through the "Free Learning - Independent Campus (MBKM)" program. This program has been aligned and incorporated into the structure of this structured OBE curriculum

The systematics and contents of this document were prepared based on the guidelines issued by the Directorate General of Higher Education, Ministry of Education and Culture in 2020. It is hoped that the curriculum adjustment document supporting the MBKM policy will serve as a reference for lecturers in charge of courses in implementing a curriculum based on National Higher Education Standards. Finally, on this occasion, we would like to thank the facilitating team who have guided and provided input and the drafting team who have worked hard, so that this document can be realized. Hopefully what we have produced has strategic meaning and is able to make a positive contribution to improving the quality of study program graduates.

Bengkulu, 04 June 2022

Drafting team,

TABLE OF CONTENTS

STUDY PROGRAM IDENTITY

A. Study Program Profile

1	NameHigher Education (PT)	Bengkulu University
		PTN □ PTS
2	Faculty	teacher training and education science
3	Department/Department	MIPA Education
4	Study program	Physical education
5	Accreditation Status	B
6	Number of Students	188
7	Number of Lecturers	10
8	Study Program Address	Jl. WR. Supratman, Cage Lemonade, Kec. Muara Bangka Hulu, Sumatra, Bengkulu 38371
9	Phone	(0736) 21186
10	PRODI/PT	http://physics.fkip.unib.ac.id/

B. Vision, Mission and Objectives of the Study Program

The Vision of the Bachelor of Physics Education Study Program FKIP UNIB is to become an Excellent Study Program in Physics Education in 2025

In an effort to realize the vision, the Physics Education S1 study program has the following missions:

a. Organizing physics education with the latest learning strategies and methods to prepare professional physics educators to support Indonesia's national development.
b. Developing research related to physics science and physics education to become the basis for the educational process and community service.
c. Organizing community service activities in the field of physics education based on the results of physics education research, community needs, as well as the development of science and technology.
d. Establish cooperation in the field of education and research in physics education with domestic and foreign institutions.

The Physics Education S1 study program has the following objectives:

a. Organizing physics education with the latest learning strategies and methods to prepare professional physics educators.
b. Developing research related to physics science and physics education to become the basis for the educational process and community service.
c. Organizing community service activities in the field of physics education based on the results of physics education research, community needs, as well as the development of science and technology.
d. Establish cooperation in the field of education and research in physics education with domestic and foreign institutions.
e. To produce professional physics educators who have high academic abilities in the field of physics and physics education and have a competitive advantage.

f. Produce and disseminate research and study works in the field of physics education that are innovative, applicable, and relevant to the needs of the community.

C. History of Study Program

The Physics Education Study Program for the PMIPA FKIP Unib Department is one of the study programs within the PMIPA FKIP Unib Department. The history of the Physics Education Study Program PMIPA FKIP Unib began with its establishment based on the Decree of the Minister of Education and Culture of the Republic of Indonesia Number 361/DIKTI/Kep/1995 which was signed by the Director General of Higher Education, Ministry of Education and Culture. The Physics Education Study Program, PMIPA FKIP Unib, is located at Jalan Raya Kandang Limun, Bengkulu City, Tel. (0736) 21876. As an educational institution that produces prospective physics teachers, the Physics Education Study Program strives to carry out its vision and mission which are based on honesty, openness and concern for the interests of society. This study program is in accordance with the BAN PT Accreditation Certificate Number:

CURRICULUM EVALUATION AND TRACER STUDY

A. Results of Evaluation of Existing Curriculum Implementation

Data from the tracer study were analyzed by means of the average items in the questionnaire. Responses from users and alumni use a scale of 1 to 5. Graduate users in this tracer study include: (1) heads/chairmen in offices/schools, (2) vice principals, (3) middle positions/secretary/treasurer, and (4) ordinary members/employees. The questionnaire for graduates includes: (1) waiting period, (2) employment status, (3) first salary, (4) self-adjustment after graduation consisting of 15 questionnaire items, (5) social adjustment consisting of 5 questionnaire items, and (6) adjustment in the workplace consists of 10 questionnaire items.

All data is tabulated per aspect per questionnaire, then the average per aspect per item is calculated. The calculation results are presented in the form of a quantitative description of the percentage and in the form of a bar chart. The last step of the analysis is to discuss and draw conclusions, implications and suggestions.

Currently there are around 218 (active) alumni who are members of alumni groups who are intensively related to the Study Program, through the WhatsApp Alumni network of Physics Study Program. Information originating from alumni users is used as material for consideration in the preparation of curricula and various policies and improvement of learning methods so that the resulting alumni meet the qualifications or criteria desired by the users (stakeholders).

The results of the tracking study are summarized in the following table:

State the percentage number (*) in the appropriate column.

No	Ability Type	User Response (%)				Follow-Up Plan by Study Program
		Very good	Well	Enough	Not enough	
1.	Integrity (ethics and morals)	40.00	60.00	0.00	0.00	Study programs and lecturers optimize interactions in a polite cultural setting
2.	Expertise by field of science (professionalism)	60.00	30.00	10.00	0.00	The study program optimizes student competency skills.
3.	English	20.00	20.00	40.00	0.00	Lecturer in English for Physics by a Physics Study Program Lecturer, not an MKU Lecturer intended to be more familiar with the concept of physics
4.	Use Information Technology	50.00	50.00	0.00	0.00	Study Program lecturers began to optimize the use of IT in e-learning
5.	Communication	40.00	60.00	0.00	0.00	Study Program optimizes the relationship between students and lecturers
6.	Teamwork	80.00	20.00	0.00	0.00	Study Program optimizes cooperation and joint activities with students
7.	Self-development	60.00	30.00	10.00	0.00	Study Program facilitates HIMAFI activities
Total		350.00	270.00	60.00	0.00	

B. Mechanism of Curriculum Evaluation Results

C. Needs Analysis Based on Stakeholder Needs from Tracer Study Results

FOUNDATION OF CURRICULUM DESIGN AND DEVELOPMENT

A. Philosophical Foundation

Philosophically, the learning process can occur in various situations and places, not only in the classroom, laboratory or library. The learning process can occur in the workplace, in the community, in the village, in community social development places, research centers, and other places and situations. Through student interaction with the real world, it is hoped that students will be able to improve their skills, social sensitivity, entrepreneurial spirit, and students' real awareness of the realities outside the campus. Thus, higher education through students can color the process of acculturation of society and civilization of the nation. Philosophical foundation, providing philosophical guidelines at the stages of designing, implementing, and improving the quality of education (Ornstein & Hunkins, 2014),

B. Sociological Basis

provide a foundation for curriculum development as an educational tool consisting of goals, materials, learning activities and a positive learning environment for the acquisition of learner experiences that are relevant to the personal and social development of learners (Ornstein & Hunkins, 2014, p. 128). The curriculum must be able to pass on culture from one generation to the next in the midst of the influence of globalization which continues to erode the existence of local culture. In this regard, Ascher and Heffron (2010) state that we need to understand under what conditions does globalization have a negative impact on one's cultural practices and beliefs, thereby weakening human dignity? Furthermore, they also conveyed that we need to recognize aspects of local culture to fortify ourselves from the influence of globalization.

This is in line with the opinion of Plafreyman (2007) which states that cultural issues are a hot topic among the academic community in various countries where universities are expected to be able to mix the interests of advancing learning processes that are oriented to the advancement of science and technology with elements of cultural diversity of students who are can produce learning outcomes with the ability to understand cultural diversity in the community, resulting in a spirit of tolerance and mutual understanding of the presence of diversity. The curriculum must be able to release students from the confines of their own rigid cultural barrier (capsulation), and are not aware of the weaknesses of their own culture. In the present context, students are expected to be able to have cultural agility which is considered a mega competency that must be possessed by prospective professionals in the 21st century with a minimum mastery of three competencies, namely, cultural minimization, namely the ability to control oneself and adjust with standards, in working conditions at the international level) cultural adaptation, and cultural integration (Caliguri, 2012)2. This concept is in line with in working conditions at the international level) cultural adaptation, as well as cultural integration (Caliguri, 2012) 2. This concept would be in line with in working conditions at the international level) cultural adaptation, and cultural integration (Caliguri, 2012)2. This concept is in line with

Ki Hadjar Dewantoro's thoughts in the concept of "Tri-Kon" stated above.

C. Psychological Foundation

provide a foundation for curriculum development, so that the curriculum is able to continuously encourage student curiosity and can motivate lifelong learning; a curriculum that can facilitate student learning so that they are able to realize their roles and functions in their environment; curriculum that can cause students to think critically, and think at a higher level and perform higher order thinking; a curriculum that is able to optimize the development of student potential to become the desired human being (Zais, 1976, p. 200); curriculum that is able to facilitate students to learn to be perfect human beings, namely human beings who are free, responsible, confident, moral or have noble character, able to collaborate, tolerant,

D. Historical Platform

Historically, the curriculum that was developed was one that was able to facilitate student learning according to the era; a curriculum that is capable of inheriting cultural values and golden history of past nations, and transforming it in the era in which it is being studied; curriculum that is able to prepare students to live better in the 21st century era of change, have an active role in the industrial era 4.0, and be able to read the signs of the industrial revolution 5.0. To deal with this, an outcome based education curriculum was developed with the hope that through student interaction with the real world it can improve students' skills, social sensitivity, entrepreneurial spirit, and real awareness of the realities outside the campus.

E. Juridical Platform

Basethe law that becomes the basis or reference at the stages of design, development, implementation, and evaluation, as well as a higher education quality assurance system that will ensure the implementation of the curriculum and the achievement of curriculum objectives. The following are several legal foundations that need to be referred to in the preparation and implementation of the curriculum:

a. Law of the Republic of Indonesia Number 14 of 2005 concerning Teachers and TeachersLecturer (State Gazette of the Republic of Indonesia of 2005 Number 157, Supplement to the State Gazette of the Republic of Indonesia Number 4586);
b. Law of the Republic of Indonesia Number 12 of 2012 concerning EducationHigh (State Gazette of the Republic of Indonesia of 2012 Number 158, Supplement to the State Gazette of the Republic of Indonesia Number 5336);
c. Presidential Regulation of the Republic of Indonesia Number 8 of 2012, concerning the Indonesian National Qualifications Framework (KKNI);
d. Regulation of the Minister of Education and Culture of the Republic of Indonesia Number 73 of 2013, concerning the Implementation of the KKNI in the Higher Education Sector;
e. Regulation of the Minister of Research, Technology and Higher Education of the Republic

Indonesia Number 62 of 2016 concerning Higher Education Quality Assurance System;

f. Regulation of the Minister of Research, Technology and Higher Education Number 59 of 2018, concerning Diplomas, Certificates of Competence, Professional Certificates, Degrees and Procedures for Writing Degrees in Higher Education;
g. Decree of the Minister of Research, Technology and Higher Education No. 123 of 2019 concerning Internships and Recognition of Industrial Internship Semester Credit Units forUndergraduate and Applied Undergraduate Programs.
h. Regulation of the Minister of Education and Culture No. 3 of 2020, concerning National Higher Education Standards;
i. Regulation of the Minister of Education and Culture No. 5 of 2020, concerning Accreditation of Study Programs and Universities;
j. Regulation of the Minister of Education and Culture No. 7 of 2020 concerning the Establishment of Changes, the Dissolution of State Universities, and the Establishment, Amendment, Revocation of Permits for Private Universities.
k. RegulationMinister of Education and Culture No. 22 of 2020, concerning the Strategic Plan of the Ministry of Education and Culture;
l. Chancellor's Regulation No 25 of 2020 concerning Organizing Academic Activities for the University of Bengkulu's Vocational, Undergraduate, Professional and Postgraduate Education Programs.

FORMULA OF VISION, MISSION, OBJECTIVES, STRATEGY, AND UNIVERSITY VALUE

A. Formulation of Study Program Vision

The vision of the Physics Education Study Program, FKIP University of Bengkulu, is to become a superior and competent study program in physics education in 2015. This vision is very clear and rational because it is in line with FKIP's vision, which is to become a world-class educational institution for education staff in 2025. Vision of an excellent Physics Education Study Program and competent means; (a) graduates as excellent and competent educators in the field of physics education; (c) excel in scientific work and community service.

B. Study Program Mission Formulation

The mission formulation of the Physics Education Study Program is:

1) Organizing education and learning physics in a professional manner.
2) Increase study education physics which oriented onthe development of physics learning and the values of national character.
3) Improving services and services based on research results and community needs.
4) Increase cooperation and partnerships with domestic and foreign institutions.
5) Carrying out good and correct governance.

C. Formulation of Study Program Objectives

The Physics Education S1 study program has the following objectives:

g. Organizing physics education with the latest learning strategies and methods to prepare professional physics educators.
h. Developing research related to physics science and physics education to become the basis for the educational process and community service.
i. Organizing community service activities in the field of physics education based on the results of physics education research, community needs, as well as the development of science and technology.
j. Establish cooperation in the field of education and research in physics education with domestic and foreign institutions.
k. To produce professional physics educators who have high academic abilities in the field of physics and physics education and have a competitive advantage.
l. Produce and disseminate research and study works in the field of physics education that are innovative, applicable, and relevant to the needs of the community.

D. Study Program Strategy Formulation

The achievement strategies carried out are (1) Improving the quality of student input; (2) Increasing the number and quality of lecturers' scientific publications; (3) Curriculum development, especially subject matter/content; (4) Standardization of lectures, (5) Standardization of educational/lecture facilities and infrastructure (6) Increasing the availability and quality of books and references in reading rooms (7) Increasing the ability of academic staff (8) Optimizing partnership and cooperation programs; (9) Optimization of information system quality management; (10) Improved service quality of Study Program Quality Assurance Group, and (11) Improved student soft skills. Thus, the strategy that has been formulated is developed through a number of relevant programs to create positive changes in the quality and relevance of the academic atmosphere, internal management, efficiency and productivity.

E. Formulation of University Values

The Government of the Republic of Indonesia through the Ministry of Education and Culture has issued 4 (four) policies known as the Merdeka Campus policy. One of the Merdeka Campus policies is a policy in the form of providing opportunities for students to be able to study for a maximum of 3 (three) semesters outside of their study program. The provision of this opportunity is outlined in the Regulation of the Minister of Education and Culture (Permendikbud) No. 3 of 2020 concerning National Higher Education Standards (SNPT). Granting the right to study outside the study program is intended as an alternative learning that can be taken or not. That is, students can take or not take learning outside the offered study program (alternative). This policy is also a form of tertiary facilitation for students to be able (or not) to pursue learning according to their passion or preferences. Through this policy, tertiary institutions provide opportunities for students to be able to enrich or improve their insights and competencies in the real world. Bengkulu University responds to this policy in the implementation of the educational process. The Freedom to Learn-Free Campus policy is contained in the Chancellor's Regulation No. 25 of 2020 concerning the Implementation of Academic Activities for the University of Bengkulu's Vocational, Undergraduate, Professional and Postgraduate Education Programs. Article 7 of the Chancellor's Regulation mentions alternative courses,

FORMULATION OF GRADUATE COMPETENCY STANDARDS (SKL)

A. Graduate Profile

The profile of graduates of the Physics Education Study Program was determined based on suggestions and input from various parties, which were formulated from tracer studies and Focus Group Discussions (FGD) for Determining Graduate Profiles which were held on 17 November 2020. The FGD for determining graduate profiles was attended by resource person Dr. Ida Kaniati, M.Sc, Dean of FKIP, WD for Academics, Chair of UPM, Head of Bengkulu Province Education and Culture Office, High School Supervisor, Principal, Chair of MGMP Physics, Teacher, Head of Tutoring, Alumni and students. Based on the suggestions from the users and stakeholders, the profiles of graduates of the Physics Education Study Program were formulated, namely: Physics Educators, Physics Education Research Assistants, and Physics Laboratory Managers.

Table 1. Graduate Profiles and their descriptions

Profile		Profile Description
PL1	Physics Educator	Educators, creative, innovative learning facilitators who educate with good mastery of physics material, have the ability to use information technology to keep abreast of developments in physics and learning
PL2	Physics Education Research Assistant	Assessing physics education problems and publishing the results in scientific forums
PL3	Physics Laboratory Manager	Managers of physics laboratories in SMA, MA, and SMK

B. Ability of Graduates from the Elements of Attitude, Knowledge, General Skills, and Special Skills

Table 2. Learning Outcomes of Study Program Graduates

ASPECT	GRADUATE LEARNING ACHIEVEMENTS
ATTITUDE (S)	
S1	Fear of God Almighty and able to show a religious attitude;
S2	Upholding human values in carrying out duties based on religion, morals and ethics;
S3	Contribute to improving the quality of life in society, nation, state, and the progress of civilization based on Pancasila;
S4	To act as citizens who are proud and love their homeland, have nationalism and a sense of responsibility to the state and nation;
S5	Appreciate the diversity of cultures, views, religions and beliefs, as well as other people's original opinions or findings;
S6	Cooperate and have social sensitivity and concern for society and the environment;
S7	Obey the law and discipline in the life of society and the state;
S8	Internalize academic values, norms and ethics;
S9	Demonstrate a responsible attitude towards work in their area of expertise independently;
S10	Internalize the spirit of independence, struggle, and entrepreneurship.
S11	Have sincerity, commitment, sincerity to develop the attitudes, values and abilities of students
GENERAL SKILLS (KU)	
KU1	Able to apply logical, critical, systematic, and innovative thinking in context development or implementation of science and technology that pays attention to and applies the values of the humanities in accordance with their field of expertise.
KU2	Able to demonstrate independent, quality, and measurable performance.

KU3	Able to examine the implications of the development or implementation of science and technology that pays attention to and applies humanities values according to their expertise based on scientific principles, procedures and ethics in order to produce solutions, ideas, designs or criticisms art.

ASPECT	GRADUATE LEARNING ACHIEVEMENTS
KU4	Able to compile a scientific description of the results of the study mentioned above in the form of a thesis or final project report, and upload it on the college website.
KU5	Able to make appropriate decisions in the context of solving problems in their area of expertise, based on the results of information and data analysis.
KU6	Able to maintain and develop a network with mentors, colleagues, peers both inside and outside the institution.
KU7	Able to be responsible for achieving the results of group work and supervising and evaluation of the completion of work assigned to workers under their responsibility.
KU8	Able to carry out the process of self-evaluation of work groups under their responsibility, and able to manage learning independently.
KU9	Able to document, store, secure, and retrieve data to ensure validity and prevent plagiarism.
SPECIAL SKILLS (KK)	
KK1	Able to make physics learning tools using scientific principles and principles of instructional design through analysis of subject matter (pedagogical content knowledge) independently in accordance with the applicable curriculum, instructional design principles, scientific approaches, utilizing science and technology, and the natural environment, and carrying out learning physics in accordance with the characteristics of the material and the characteristics of students to be able to develop thinking skills and scientific attitudes.
KK2	Able to analyze problems, find sources of problems, solve problems in the physics learning process and physics laboratory management problems in accordance with the rules of physics science and propose various alternative solutions to problems and conclude it for making the right decisions and become lifelong learners who are more independent and able to adapt to the dynamic changing times.
KK3	Able to conduct reflective analysis of learning to improve the quality of learning physics, conduct research with quantitative and/or qualitative approaches to solve physics learning problems, review research results and make research results reports in the form of scientific articles for publication.
KNOWLEDGE (P)	
P1	Mastering the concepts, principles, laws and theories of physics.
P2	Mastering the concepts, principles, and applications of mathematics, statistics, computing, electronics, and languages to support the physics learning process.
P3	Mastering learning theory, curriculum concepts and physics learning, methods and strategies physics learning, physics learning planning, development of teaching materials, media and assessment of physics learning and development of physics laboratory tools for schools.
P4	Mastering physics education research methodology, laboratory management for physics learning and the concept of entrepreneurship.

C. Formulation of Graduate Learning Achievement (CPL) Study Program

Table 3. Profile & CPL relationship matrix Prodi

CPL Prodi		PL1	PL2	PL3
ATTITUDE				
S1	Fear of God Almighty and able to show a religious attitude.	✓	✓	✓
S2	Upholding human values in carrying out their duties based on religion, morals, and ethics.	✓	✓	✓
S3	Contribute to improving the quality of life in society, nation, state, and the advancement of civilization based on Pancasila.	✓	✓	✓
S4	Act as a citizen who is proud and loves the motherland, has nationalism and a sense of responsibility to the state and nation.	✓	✓	✓
S5	Respect the diversity of cultures, views, religions and beliefs, as well as the opinions or original findings of others.	✓	✓	✓
S6	Working together and having social sensitivity and concern for society and the environment.	✓	✓	✓
S7	Obey the law and discipline in social and state life.	✓	✓	✓
S8	Internalize academic values, norms, and ethics.	✓	✓	✓
S9	Demonstrate a responsible attitude towards work in their area of expertise independently.	✓	✓	✓
S10	Internalize spirit independence, shock, andentrepreneurship.	✓	✓	✓
S11	Acting and behaving scientifically, educatively and religiously, as well as compassionate, compassionate, fostering in work and life environment society that has global competitive and comparative advantages.	✓		✓
GENERAL SKILLS				
KU1	Able to apply logical, critical, systematic, and innovative thinking in the context of developing or implementing science and technology that pays attention to and applies humanities values appropriate to their area of expertise.	✓	✓	✓
KU2	Able to demonstrate independent, quality, and measurable performance.	✓	✓	✓
KU3	Able to examine the implications of the development or implementation of science and technology that pays attention to and applies the values of the humanities in accordance with their expertise based on rules, procedures and scientific ethics in order to produce solutions, ideas, designs or art criticism.	✓	✓	✓
KU4	Able to compile a scientific description of the results of the study mentioned above in the form of a thesis or final project report, and upload it on the college website.	✓	✓	✓
KU5	Able to make the right decisions in the context of completion problems in their area of expertise, based on the results of information and data analysis.	✓	✓	✓
KU6	Able to maintain and develop a network with supervisors, colleagues, colleagues both inside and outside the institution.	✓	✓	✓
KU7	Able to be responsible for the achievement of group work results and supervise and evaluate the completion of the work assigned to workers who are under it responsibility.	✓	✓	✓
KU8	Able to carry out the process of self-evaluation of work groups under his responsibility, and able to manage independent learning.	✓	✓	
KU9	Capable document, keep, secure, andrecover data to ensure validity and prevent plagiarism.	✓	✓	

SPECIAL SKILL				
KK1	Able to make physics learning tools using scientific principles and principles of instructional design through analysis of subject matter (pedagogical content knowledge) independently in accordance with the applicable curriculum, instructional design principles, scientific approaches, utilizing science and technology, and the natural environment, and carrying out learning physics according to material characteristics and student characteristics in order to be able to develop thinking skills and scientific attitudes.	√	√	√
KK2	Able to analyze problems, find sources of problems, solve problems in the physics learning process and physics laboratory management problems in accordance with the rules of physics science and propose various alternative solutions to problems and conclude them for making the right decisions and become more independent and capable lifelong learners adapt to the dynamic changes of the times.	√	√	√
KK3	Able to conduct reflective analysis of learning to improve the quality of physics learning, conduct research with quantitative and/or qualitative approaches to solve problems learning physics, reviewing research results and making research results reports in the form of scientific articles for publication.	√		
KNOWLEDGE (P)				
P1	Mastering the concepts, principles, laws and theories of physics.			
P2	Mastering the concepts, principles and applications of mathematics, statistics, computing, electronics, and language to support the physics learning process.			
P3	Mastering learning theory, curriculum concepts and physics learning, physics learning methods and strategies, physics lesson planning, development of teaching materials, media and assessment of physics learning and development of physics laboratory tools for schools.			
P4	Mastering physics education research methodology, laboratory management for physics learning and the concept of entrepreneurship.			

Table 4. Matrix of Study Program CPL & Educational Objectives

CPL Prodi		TP1	TP2	TP3	TP4	TP5	TP6
Attitude							
S1	Fear of God Almighty and able to show a religious attitude.						
S2	Uphold tall score humanity incarrying out duties based on religion, morals, and ethics.						
S3	Contribute to improving the quality of life in society, nation, state, and the advancement of civilization based on Pancasila.						
S4	Act as a citizen who is proud and loves the motherland, has nationalism and a sense of responsibility to the state and nation.						
S5	Respect the diversity of cultures, views, religions and beliefs, as well as the opinions or original findings of others.						
S6	Working together and having social sensitivity and concern for society and the environment.						
S7	obey law and discipline in lifesociety and state.						
S8	Internalize academic values, norms, and ethics.						
S9	Demonstrate a responsible attitude towards work in their area of expertise independently.						
S10	Internalize the spirit of independence, struggle, and entrepreneurship.						

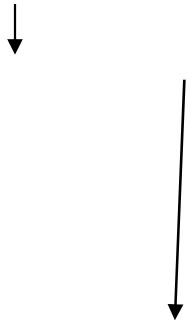
S11	Scientific, educative and religious attitude and behavior, as well as compassion, honing, nurturing in a work environment and social life that have global competitive and comparative advantages.						
General Skills							
KU1	Able to apply logical, critical, systematic, and innovative thinking in the context of the development or implementation of science and technology that pays attention to and applies values humanities in accordance with their field of expertise.						
KU2	Able to demonstrate independent, quality, and measurable performance.						
KU3	Able to examine the implications of the development or implementation of science and technology that pays attention to and applies the values of the humanities in accordance with their expertise based on rules, procedures scientific methods and ethics in order to produce solutions, ideas, designs or art criticism.						
KU4	Able to compile a scientific description of the results of the study mentioned above in the form of a thesis or final project report, and upload it on the college website.						
KU5	Able to make appropriate decisions in the context of solving problems in their area of expertise, based on the results of information and data analysis.						
KU6	Able to maintain and develop networks						
	work with mentors, colleagues, peers both inside and outside the institution.						
KU7	Able to be responsible for the achievement of group work results and supervise and evaluate the completion of the work assigned to workers who are under it responsibility.						
KU8	Able to carry out the process of self-evaluation of work groups under their responsibility, and able to manage learning independently.						
KU9	Able to document, store, secure, and retrieve data for ensure validity and prevent plagiarism.						
Special skill							
KK1	Able to make physics learning tools using scientific principles and principles of instructional design through analysis of subject matter (pedagogical content knowledge) independently in accordance with the applicable curriculum, principles of instructional design, scientific approach, utilizing science and technology, and the natural environment, and carrying out learning physics in accordance with the characteristics of the material and the characteristics of students so that able to develop the ability to think and scientific attitude.						
KK2	Able to analyze problems, find sources of problems, solve problems in the physics learning process and physics laboratory management problems in accordance with the scientific principles of physics and propose various alternative solutions to problems and conclude them for making the right decisions and become lifelong learners who are more independent and able to adapt to dynamic changing times.						

KK3	Able to conduct reflective analysis of learning to improve the quality of physics learning, conduct research with quantitative and or qualitative approaches to solve physics learning problems, review research results and report research results in the form of scientific articles for publication.						
KNOWLEDGE (P)							
P1	Mastering the concepts, principles, laws and theories of physics.						
P2	Mastering the concepts, principles, and applications of mathematics, statistics, computing, electronics, and languages to support the physics learning process.						
P3	Mastering learning theory, curriculum concepts and physics learning, physics learning methods and strategies, planning physics lessons, developing teaching materials, media and physics learning assessment and development of physics laboratory tools for schools.						
P4	Mastering physics education research methodology, laboratory management for physics learning and the concept of entrepreneurship.						

DETERMINATION OF STUDY MATERIALS

A. CPL Component Analysis with Study Materials and Context Based on the Body of Knowledge of the Study Program

*Body of knowledge*or science and expertise that will be held by the Physics Education Study Program FKIPUNIB covers the fields of physics, methodological-pedagogic fields (educational sciences), and other fields that are in accordance with physics learning. The science has a relationship and constellation with similar fields with Physics Education at the S-2 and S-3 levels, even correlates with the field of physics. Thus, the scientific fields that are held become adequate provisions to continue their studies to a higher strata (S-2) or Teacher Professional Education. In a wider area, these knowledges and skills are also related and constellation of cognate fields (Science: Chemistry and Biology), mathematics, and the appropriate fields of application in science and technology (ICT and Media). Fields of study of physics related to Mechanics, Thermodynamics, Quantum Physics, Modern Physics and Electrodynamics along with natural phenomena and living things and life processes are studied in the Physics Education Study Program. The flowchart of the body of knowledge of the S-1 Physics Education Study Program FKIP UNIB in outline is shown in Figure



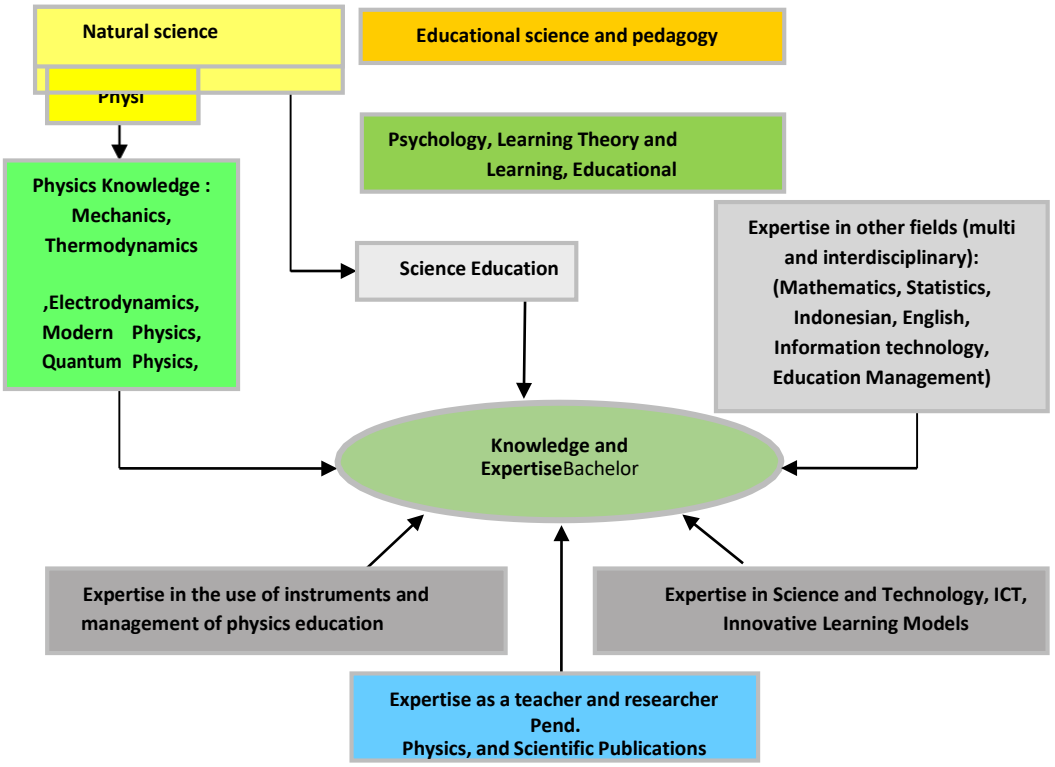


Figure 1. Map of scientific linkages and expertise of the Physics Education Study Program with other fields.

B. Matrix of Linkages between CPL and Study Materials

	BD1	BD2	BD3	BD4	BP1	BP2	BP3	BP4	BP5	BP6	BP7	BP8	BP9	BP10	BP11	BP12	BP13	BP14	BP15	BM1	BM2	BM3	BM4	BM5	BM6	BM7	BM8	BM9	BM10	BM11
ATTITUDE																														
S1	X																													
S2	X																													
S3	X																													
S4	X																													
S5	X																													
S6	X																													
S7	X																													
S8		X																												
S9		X																												
S10			X																											
S11					X																									
SKILLS																														
KU1				X																										
KU2					X																									
KU3				X		X									X															
KU4				X																										
KU5		X		X																										
KU6		X			X																									
KU7					x									x																
KU8														x																
KU9				x																										
KK1					x	x	x	x	x		x	x	x	x	x	x	x													
KK2																		x	x											
KK3													x	x																
KNOWLEDGE																														
P1																						x	x	x	x		x	x	x	x
P2																				x	x					x				
P3					x	x	x	x	x	x	x	x	x	x	x	x														
P4			x														x													

Table 5. Study Materials (BK)

Code	Study Material (BK)	Description of Study Material
Basic Abilities (BD)		
BD1	Social and Humanities	To understand and solve humanitarian and social problems based on adherent religious beliefs related to education and social and community interaction
BD2	Basic knowledge	To improve the mastery of basic science needed in solving physics learning problems at school
BD3	Entrepreneurship	To increase entrepreneurial insight related to the role of graduates in society as educators
BD4	Science and Technology Insight	To increase the knowledge of science and technology graduates and their role in society as educators
Pedagogic Ability (BP)		
BP1	development and characteristics of learners	To master the characteristics of students from the physical, moral, spiritual, social, cultural, emotional, and intellectual aspects
BP2	learning theories	To master learning theories
BP3	nature of physics and physics education	To understand the nature of physics and physics education
BP4	scientific thinking pattern	To master the pattern of scientific thinking
BP5	Innovative learning strategies/models/methods oriented to life skills in development. physics	To master innovative learning strategies/models/methods oriented towards life skills in physics learning
BP6	characteristics of school physics material	To identify the characteristics of school physics material
BP7	physics-based learning devices activities to develop students' thinking skills	To design activity-based physics learning tools to develop students' thinking skills
BP8	high school physics curriculum development	To understand the development of high school physics curriculum
BP9	principles of assessment in learning physics	To master the principles of assessment in physics learning
BP10	difficulties and success of student learning (through diagnosis, formative, and summative) and use the results to design better learning according to student characteristics	To analyze the difficulties and success of students' learning (through diagnosis, formative, and summative) and use the results to design better learning according to the characteristics of students
BP11	the principles of developing ICT-based physics learning media	To master the principles of ICT-based physics learning media development
BP12	the principles of environmental-based physics learning media development around	To master the principles of developing environmental-based physics learning media
BP13	qualitative and/or qualitative research methods in solving learning problems physics	To master quantitative and/or qualitative research methods in solving physics learning problems
BP14	resource management in class administration	To master the management of resources in class administration
BP15	management of resources in the administration of laboratories and educational institutions	To master the management of resources in the administration of laboratories and educational institutions
Mastery of Physics Materials (BM)		
BM1	Basic Concepts of Mathematics	To master the basic concepts of mathematics in supporting the mastery of physics concepts
BM2	Computational and instrumentation techniques	To master computational and instrumentation techniques in supporting the understanding of physics concepts
BM3	Concepts/principles/theories in classical mechanics, mechanics of many-particle systems, and fluid mechanics	To master the concepts/principles/theories of classical mechanics, mechanics of many particle systems, and fluid mechanics
BM4	Concept/principle/theoryin thermodynamics and statistical physics	To master the concepts/principles/theories in thermodynamics and statistical physics
BM5	Concepts/principles/theories in vibrations and waves	To master concepts/principles/theories in vibration and waves
BM6	Concepts/principles/theories in optics	To master the concepts/principles/theories in optics
BM7	Concepts/principles/theories in electromagnetics	To master the concept/principle/theory in electromagnetic
BM8	Concepts/principles/theories in modern and quantum physics	To master concepts/principles/theories in modern and quantum physics
BM9	Concepts/principles/theories in core physics	To master concepts/principles/theories in core physics
BM10	Concepts/principles/theories in solid-state physics	To master the concepts/principles/theories in solid state physics
BM11	Concepts/principles/theories in earth physics	To master concepts/principles/theories in earth physics

ESTABLISHMENT OF COURSES (MK) AND DETERMINATION OF SKS WEIGHT

Courses are formed based on Learning Outcomes (CPL) which are assigned to courses and study materials that are in accordance with the CPL. Its formation can use the matrix pattern as follows:

Mandatory before MBKM (smtr 1-5) and smtr 8

CPL	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	KU1	KU2	KU3	KU4	KU5	KU6	KU7	KU8	KU9	KK1	KK2	KK3	P1	P2	P3	P4	**Weight credits**
MKU101	x				x		X																					3
MKU102		x	x				X	X																				2
MKU103				x																					x			2
MKU104																									x			2
MKU105												X		X														2
MKU106												X		X														3
MKU300												X		X											x			2
MKU400							X	X																				4
MFA101												X		X										x				2
MFA102												X		X										x				3
MFA103												X		X										x				2
MFA104												X		X							X						x	2
MFA105												X		X							X					x		2
FIS101												X		X											x			3
FIS102												X		X											x			4
FIS103												X		X											x			3
FIS104												X		X										x				2
FIS105												X		X										x				4
FIS106												X		X											x			1
FIS201												X		X											x			4
FIS202												X		X										x				3
FIS203												X		X										x				3
FIS204												X		X										x				3
FIS205												X		X							X		X			x		2
FIS206												X		X							X					x		2
FIS207												X		X													x	2
FIS210												X		X							X		X			x		2
FIS211												X		X													x	3
FIS212												X		X										x				3
FIS213												X		X										x				3
FIS214												X		X										x				2
FIS215						X	X	X	X	X	X	X	X	X			X	X	X	X								3
FIS216												X		X												x		2
FIS301												X		X												x		4
FIS302												X		X												x		3
FIS401												X		X													x	3
FIS402						x			X	X	X	X	X	X	X	X	X	X	X	X			X			x		2
FIS413					x					X	X	X	X	X	X			X	X	X			X				x	4
FIS414					x	x		X	X	X	X	X	X	X	X	X		X	X	X			X					2
Total																												147

	Elective courses are contracted courses in semesters 6 and 7. In this course there are 50 elective courses which are determined according to the results of guidance from PA lecturers																												credits
	CPL	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	KU1	KU2	KU3	KU4	KU5	KU6	KU7	KU8	KU9	KK1	KK2	KK3	P1	P2	P3	P4	
Must choose for not MBKM	Disaster Safe Education																										x		2
	Web-Based Pemb Media														x												x		2
	Pemb Media. Android Based														x												x		2
	High school physics																										x		2
	Distance Learning Physics																										x		2
	Mixed Physics Learning																										X		2
	High School Physics Learning Innovation																										X		2
	English for physics teachers																										X		2
	Alternative Assessment																										x		2
	Earth and Space Science																								x				2
	High School Physics Practicum Study																										x		2
	Research Statistics												x		x													x	2
	International Studies Review																											x	2
	Development of Teaching Materials												x														x		2
Additional Options regarding MBKM	Physics Experimenter																									x			2
	Hybrid physics learning																										x		2
	Conservation of natural resources																								x				2
	High School Physics																								x				2
	Item response theory																										x		2
	Education measurement																										x		2
	Physics education case studies												x		x													x	2
	Application of Technology in Physics Pemb																										x		2
	Peng Profession Teacher Physics																										x		2
	Integrated IPA																								x				2
	Pemb. Science and technology thematic																								x				2
	ICT-based assessment																										x		2
	Management of educational institutions																										x		2
	Long life education																										x		2
	Bukit Barisan Volcanology																								x				2
	Introduction to																								x				2

Oceanography																													
Bukit Barisan Geothermal Study																									x				2
Electrical Circuit Analysis																									x				2
Arduino programming																										x			2
Arduino Interface																										x			2
Smart Sensor																										x			2
Quantun Transport																									x				2

Bilinear system																									x				2
Quantum mechanics																									x				2
Quantum bit system																									x				2
Quantum optics																									x				2
Quantum Control																									x				2
Linear algebra and mixed notation																									x				2
Quantum simulation and modeling																									x				2
Algorithms and programming																									x				2
Numerical analysis																									x				2
Hydrometerological hazards																									x				2
Climate change adaptation and mitigation																									x				2
Earthquakes, tsunamis and volcanic eruptions																									x				2
Floods and landslides																									x				2
Capital and disaster simulation																									x				2

MATRIC AND CURRICULUM MAP

A. Matrix of Course Organization in Curriculum Structure

Table 9. Organizational Matrix of Study Program Subjects

Smt	credits	Jlm MK	GRADUATE PROGRAM COURSES GROUP / D4										
			Mandatory Constitutional Court									MK Choice	MKWUN
VIII	6	1	Thesis										
VII	20	8	Introduction to the School Field	Physics Seminar								Elective MK of 9 credits	KKN
VI	20	8	Introduction to Core Physics	Micro Learning	Research methodology Education							Selected Constitutional Court as many as 13 credits	
V	20	7	Introduction to Solids Physics	Magnetic Electricity	Computational Physics	Entrepreneurship						Elective MK of 9 credits	Entrepreneurship
IV	20	8	Laboratory Management	Modern Physics	Quantum Physics	Physics Learning Media	Evaluation Physics Learning	Physics Curriculum Review	Optics	Mathematics For Quantum			
III	20	8	Electronics	Electronics Practicum	Mechanics	Wave	Pemb Strategy. Physics	Physics Lesson Planning	Thermodynamics	Your hydrodynamics			
II	21	8	Particle System Mechanics	Experiment Physics	Philosophy of Education	CurriculumAnd Learning	Education Management	Math For Mekanka					CitizenshipIndonesian
I	20	7	Classical Mechanics	Differentiation and Integral for Physics	DevelopmentLearners								Pend. Religion Pancasila English Computer and programming (Codding)
Total	145	55											

Notes: Elective courses

1. High school physics
2. English for physics teachers
3. High School Physics Practicum Study
4. Development of Teaching Materials
5. Alternative Assessment
6. Web-Based Learning Media
7. Android-Based Learning Media
8. Distance Learning Physics
9. Mixed Physics Learning
10. Disaster Safe Education
11. Earth and Space Science
12. Research Statistics
13. Review the Results of International Studies
14. Physics Learning Innovation
15. Physics Experiment Development
16. Hybrid physics learning
17. Conservation of natural resources
18. High School Physics
19. Item response theory
20. Education measurement
21. Physics education case studies
22. Technology Applications in Physics Learning
23. Physics Teacher Professional Development
24. Integrated IPA
25. Pemb. Science and technology thematic
26. ICT-based assessment
27. Management of educational institutions
28. Long life education
29. Bukit Barisan Volcanology
30. Introduction to Oceanography
31. Bukit Barisan Geothermal Study

32. Electrical Circuit Analysis
33. Arduino programming
34. Arduino Interface
35. Smart Sensor
36. Quantun Transport
37. Bilinear system
38. Quantum mechanics
39. Quantum bit system
40. Quantum optics
41. Quantum Control
42. Linear algebra and mixed notation
43. Simulation and quantum capital
44. Algorithms and programming
45. Numerical analysis
46. Hydrometerological hazards
47. Climate change adaptation and mitigation
48. Earthquakes, tsunamis and volcanic eruptions
49. Floods and landslides
50. Capital and disaster simulation

B. Map of the OBE Study Program Curriculum with the Implementation of the MBKM Program

SEMESTER 1

No	Code		Subject	T	P	J
1	MKU	101	Religious education	1	2	3
2	MKU	102	Pancasila	1	1	2
3	MKU	105	English	1	1	2
4	MKU	106	Computer And Programming (Coding)	1	2	3
5	MFA	102	Student Development	3	0	3
6	FIS	101	Classical Mechanics	3	0	3
7	FIS	102	Differentiation And Integral For Physics	4	0	4
				14	6	20

SEMESTER 2

No	Code		Subject	T	P	J
1	MKU	103	Indonesian	1	2	3
2	MKU	104	Citizenship	1	1	2
3	MFA	101	Philosophy of Education	2	0	2
4	MFA	103	Curriculum And Learning	2	0	2
5	MFA	104	Education Management	2	0	2
6	FIS	102	Particle System Mechanics	4	0	4
7	FIS	104	Physics Experiment	0	2	2
8	FIS	105	Math For Mechanics	4	0	4
				16	5	21

3RD SEMESTER

No	Code		Subject	T	P	J
1	FIS	201	Electronics	3	0	3
2	FIS	217	Electronics Practicum	0	1	1
3	FIS	202	Mechanics	3	0	3
4	FIS	203	Thermodynamics	3	0	3
5	FIS	204	Wave	2	1	3
6	FIS	206	Physics Learning Strategy	2	0	2
7	FIS	207	Physics Lesson Planning	2	0	2
8	FIS	211	Hydrodynamics	3	0	3
				19	1	20

SEMESTER 4

No	Code		Subject	T	P	J
1	FIS	208	Laboratory Management	2	0	2
3	FIS	209	Optics	2	0	2
3	FIS	210	Mathematics For Quantum	3	0	3
4	FIS	205	Physics Learning Media	2	1	3
5	FIS	212	Quantum Physics	2	0	2
6	FIS	214	Physics Learning Evaluation	3	0	3
7	FIS	215	Physics Curriculum Review	3	0	3
8	FIS	216	Modern Physics	2	0	2
				20	0	20

SEMESTER 5

No	Code		Subject	T	P	J
1	MKU	300	Entrepreneurship	1	1	2
2	FIS	305	Computational Physics	2	1	3
3	FIS	304	Introduction to Solids Physics	2	0	2
4	FIS	301	Magnetic Electricity	4	0	4
5	FIS		Elective Courses 1-5	9		9
				18	2	20

SEMESTER 6

No	Code		Subject	T	P	J
1	FIS	302	Educational Research Methodology	2	1	3
2	FIS	303	Introduction to Core Physics	2	0	2
3	FIS	306	Micro Learning	2	0	2
4	FIS		Elective Courses 6-11	12	0	13
				20	0	20

SEMESTER 7

No	Code		Subject	T	P	J
1	MKU	400	Community Service Program	0	4	4
2	FIS	401	Peng. School Field	0	4	4
3	FIS	402	Physics Seminar	2	0	2
4	FIS		Elective Courses 12-17	10	0	10
				12	8	20

SEMESTER 8

No	Code		Subject	T	P	J
1	Code	413	Thesis	0	6	6

Elective courses

403. High school physics
404. English for physics teachers
405. High School Physics Practicum Study
406. Development of Teaching Materials
407. Alternative Assessment
408. Web-Based Learning Media
409. Android-Based Learning Media
410. Distance Learning Physics
411. Mixed Physics Learning
412. Disaster Safe Education
414. Earth and Space Science
415. Research Statistics
416. Review the Results of International Studies
417. Physics Learning Innovation
418. Physics Experiment Development
419. Hybrid physics learning
420. Conservation of natural resources
421. High School Physics
422. Item response theory
423. Education measurement
424. Physics education case studies
425. Application of Technology in Physics Pemb
426. Physics Teacher Professional Development
427. Integrated IPA
428. Pemb. Science and technology thematic
429. ICT-based assessment
430. Management of educational institutions
431. Long life education
432. Bukit Barisan Volcanology
433. Introduction to Oceanography
434. Bukit Barisan Geothermal Study
435. Electrical Circuit Analysis
436. Arduino programming
437. Arduino Interface
438. Smart Sensor
439. Quantun Transport
440. Bilinear system
441. Quantum mechanics
442. Quantum bit system
443. Quantum optics
444. Quantum Control
445. Linear algebra and mixed notation
446. Simulation and quantum capital
447. Algorithms and programming
448. Numerical analysis
449. Hydrometerological hazards
450. Climate change adaptation and mitigation
451. Earthquakes, tsunamis and volcanic eruptions
452. Floods and landslides
453. Capital and disaster simulation

SEMESTER LEARNING PLAN

A. Learning Design Stages

Learning planning is entirely the responsibility of the supporting lecturer, while planning is carried out in the form of RPS (semester learning plans). For students who take part in MBKM activities, the description of the activities will adjust to the recognized courses. With reference to the description of the activity, it is determined by the supporting lecturer.

B. Semester Lesson Plan

The RPS for each subject is attached

A. Plan for the Implementation of Learning Rights Outside the Study Program at the Same University

SEMESTER 1

No	Code		Subject	T	P	J
1	MKU	101	Religious education	1	2	3
2	MKU	102	Pancasila	1	1	2
3	MKU	105	English	1	1	2
4	MKU	106	Computer And Programming (Coding)	1	2	3
5	MFA	102	Student Development	3	0	3
6	FIS	101	Classical Mechanics	3	0	3
7	FIS	102	Differentiation And Integral For Physics	4	0	4
				14	6	20

SEMESTER 2

No	Code		Subject	T	P	J
1	MKU	103	Indonesian	1	2	3
2	MKU	104	Citizenship	1	1	2
3	MFA	101	Philosophy of Education	2	0	2
4	MFA	103	Curriculum And Learning	2	0	2
5	MFA	104	Education Management	2	0	2
6	FIS	102	Particle System Mechanics	4	0	4
7	FIS	104	Physics Experiment	0	2	2
8	FIS	105	Math For Mechanics	4	0	4
				16	5	21

3RD SEMESTER

No	Code		Subject	T	P	J
1	FIS	201	Electronics	3	0	3
2	FIS	217	Electronics Practicum	0	1	1
3	FIS	202	Mechanics	3	0	3
4	FIS	203	Thermodynamics	3	0	3
5	FIS	204	Wave	2	1	3
6	FIS	206	Physics Learning Strategy	2	0	2
7	FIS	207	Physics Lesson Planning	2	0	2
8	FIS	211	Hydrodynamics	3	0	3
				19	1	20

SEMESTER 4

No	Code		Subject	T	P	J
1	FIS	208	Laboratory Management	2	0	2
3	FIS	209	Optics	2	0	2
3	FIS	210	Mathematics For Quantum	3	0	3
4	FIS	205	Physics Learning Media	2	1	3
5	FIS	212	Quantum Physics	2	0	2
6	FIS	214	Physics Learning Evaluation	3	0	3
7	FIS	215	Physics Curriculum Review	3	0	3
8	FIS	216	Modern Physics	2	0	2
				20	0	20

SEMESTER 5

No	Code		Subject	T	P	J
1	MKU	300	Entrepreneurship	1	1	2
2	FIS	305	Computational Physics	2	1	3
3	FIS	304	Introduction to Solids Physics	2	0	2
4	FIS	301	Magnetic Electricity	4	0	4
5	FIS		Elective Courses 1-5	9		9
				18	2	20

SEMESTER 6

No	Code		Subject	T	P	J
1	FIS	302	Educational Research Methodology	2	1	3
2	FIS	303	Introduction to Core Physics	2	0	2
3	FIS	306	Micro Learning	2	0	2
4	FIS		Elective Courses 6-11	12	0	13
				20	0	20

SEMESTER 7

No	Code		Subject	T	P	J
1	MKU	400	Community Service Program	0	4	4
2	FIS	401	Peng. School Field	0	4	4
3	FIS	402	Physics Seminar	2	0	2
4	FIS		Elective Courses 12-17	10	0	10
				12	8	20

SEMESTER 8

No	Code		Subject	T	P	J
1	Code	413	Thesis	0	6	6

Notes
For the opportunity for students to study outside the study program, students are given the freedom to contract lectures in accordance with the activities taken, as long as the courses taken can be recognized as elective courses

Elective courses
413. High school physics
414. English for physics teachers
415. High School Physics Practicum Study
416. Development of Teaching Materials
417. Alternative Assessment
418. Web-Based Learning Media
419. Android-Based Learning Media
420. Distance Learning Physics
421. Mixed Physics Learning
422. Disaster Safe Education
454. Earth and Space Science
455. Research Statistics
456. Review the Results of International Studies
457. Physics Learning Innovation
458. Physics Experiment Development
459. Hybrid physics learning
460. Conservation of natural resources
461. High School Physics
462. Item response theory
463. Education measurement
464. Physics education case studies
465. Application of Technology in Physics Pemb
466. Physics Teacher Professional Development
467. Integrated IPA
468. Pemb. Science and technology thematic
469. ICT-based assessment
470. Management of educational institutions
471. Long life education
472. Bukit Barisan Volcanology
473. Introduction to Oceanography
474. Bukit Barisan Geothermal Study
475. Electrical Circuit Analysis
476. Arduino programming
477. Arduino Interface
478. Smart Sensor
479. Quantun Transport
480. Bilinear system
481. Quantum mechanics
482. Quantum bit system
483. Quantum optics
484. Quantum Control
485. Linear algebra and mixed notation
486. Simulation and quantum capital
487. Algorithms and programming
488. Numerical analysis
489. Hydrometerological hazards
490. Climate change adaptation and mitigation
491. Earthquakes, tsunamis and volcanic eruptions
merapi
492. Floods and landslides
493. Capital and disaster simulation

SEMESTER 1

No	Code		Subject	T	P	J
1	MKU	101	Religious education	1	2	3
2	MKU	102	Pancasila	1	1	2
3	MKU	105	English	1	1	2
4	MKU	106	Computer And Programming (Coding)	1	2	3
5	MFA	102	Student Development	3	0	3
6	FIS	101	Classical Mechanics	3	0	3
7	FIS	102	Differentiation And Integral For Physics	4	0	4
				14	6	20

SEMESTER 2

No	Code		Subject	T	P	J
1	MKU	103	Indonesian	1	2	3
2	MKU	104	Citizenship	1	1	2
3	MFA	101	Philosophy of Education	2	0	2
4	MFA	103	Curriculum And Learning	2	0	2
5	MFA	104	Education Management	2	0	2
6	FIS	102	Particle System Mechanics	4	0	4
7	FIS	104	Physics Experiment	0	2	2
8	FIS	105	Math For Mechanics	4	0	4
				16	5	21

3RD SEMESTER

No	Code		Subject	T	P	J
1	FIS	201	Electronics	3	0	3
2	FIS	217	Electronics Practicum	0	1	1
3	FIS	202	Mechanics	3	0	3
4	FIS	203	Thermodynamics	3	0	3
5	FIS	204	Wave	2	1	3
6	FIS	206	Physics Learning Strategy	2	0	2
7	FIS	207	Physics Lesson Planning	2	0	2
8	FIS	211	Hydrodynamics	3	0	3
				19	1	20

SEMESTER 4

No	Code		Subject	T	P	J
1	FIS	208	Laboratory Management	2	0	2
3	FIS	209	Optics	2	0	2
3	FIS	210	Mathematics For Quantum	3	0	3
4	FIS	205	Physics Learning Media	2	1	3
5	FIS	212	Quantum Physics	2	0	2
6	FIS	214	Physics Learning Evaluation	3	0	3
7	FIS	215	Physics Curriculum Review	3	0	3
8	FIS	216	Modern Physics	2	0	2
				20	0	20

SEMESTER 5

No	Code		Subject	T	P	J
1	MKU	300	Entrepreneurship	1	1	2
2	FIS	305	Computational Physics	2	1	3
3	FIS	304	Introduction to Solids Physics	2	0	2
4	FIS	301	Magnetic Electricity	4	0	4
5	FIS		Elective Courses 1-5	9		9
				18	2	20

SEMESTER 6

No	Code		Subject	T	P	J
1	FIS	302	Educational Research Methodology	2	1	3
2	FIS	303	Introduction to Core Physics	2	0	2
3	FIS	306	Micro Learning	2	0	2
4	FIS		Elective Courses 6-11	12	0	13
				20	0	20

SEMESTER 7

No	Code		Subject	T	P	J
1	MKU	400	Community Service Program	0	4	4
2	FIS	401	Peng. School Field	0	4	4
3	FIS	402	Physics Seminar	2	0	2
4	FIS		Elective Courses 12-17	10	0	10
5	FIS					
6	FIS					
7	FIS					
8	FIS					
				12	8	20

SEMESTER 8

No	Code		Subject	T	P	J
1	Code	413	Thesis	0	6	6

For the opportunity for students to study outside the study program in PT, students are an given the freedom to contract lectures in any study program as long as the courses taken can be recognized as elective courses.

Elective courses

423. High school physics
424. English for physics teachers
425. High School Physics Practicum Study
426. Development of Teaching Materials
427. Alternative Assessment
428. Web-Based Learning Media
429. Android-Based Learning Media
430. Distance Learning Physics
431. Mixed Physics Learning
432. Disaster Safe Education
494. Earth and Space Science
495. Research Statistics
496. Review the Results of International Studies
497. Physics Learning Innovation
498. Physics Experiment Development
499. Hybrid physics learning
500. Conservation of natural resources
501. High School Physics
502. Item response theory
503. Education measurement
504. Physics education case studies
505. Application of Technology in Physics Pemb
506. Physics Teacher Professional Development
507. Integrated IPA
508. Pemb. Science and technology thematic
509. ICT-based assessment
510. Management of educational institutions
511. Long life education
512. Bukit Barisan Volcanology
513. Introduction to Oceanography
514. Bukit Barisan Geothermal Study
515. Electrical Circuit Analysis
516. Arduino programming
517. Arduino Interface
518. Smart Sensor
519. Quantun Transport
520. Bilinear system
521. Quantum mechanics
522. Quantum bit system
523. Quantum optics
524. Quantum Control
525. Linear algebra and mixed notation
526. Simulation and quantum capital
527. Algorithms and programming
528. Numerical analysis
529. Hydrometerological hazards
530. Climate change adaptation and mitigation
531. Earthquakes, tsunamis and volcanic eruptions merapi
532. Floods and landslides
533. Capital and disaster simulation

B. The Plan for Implementation of the Right to Study in the Same Study Program Outside PT

SEMESTER 1

No	Code		Subject	T	P	J
1	MKU	101	Religious education	1	2	3
2	MKU	102	Pancasila	1	1	2
3	MKU	105	English	1	1	2
4	MKU	106	Computer And Programming (Coding)	1	2	3
5	MFA	102	Student Development	3	0	3
6	FIS	101	Classical Mechanics	3	0	3
7	FIS	102	Differentiation And Integral For Physics	4	0	4
				14	6	20

SEMESTER 2

No	Code		Subject	T	P	J
1	MKU	103	Indonesian	1	2	3
2	MKU	104	Citizenship	1	1	2
3	MFA	101	Philosophy of Education	2	0	2
4	MFA	103	Curriculum And Learning	2	0	2
5	MFA	104	Education Management	2	0	2
6	FIS	102	Particle System Mechanics	4	0	4
7	FIS	104	Physics Experiment	0	2	2
8	FIS	105	Math For Mechanics	4	0	4
				16	5	21

3RD SEMESTER

No	Code		Subject	T	P	J
1	FIS	201	Electronics	3	0	3
2	FIS	217	Electronics Practicum	0	1	1
3	FIS	202	Mechanics	3	0	3
4	FIS	203	Thermodynamics	3	0	3
5	FIS	204	Wave	2	1	3
6	FIS	206	Physics Learning Strategy	2	0	2
7	FIS	207	Physics Lesson Planning	2	0	2
8	FIS	211	Hydrodynamics	3	0	3
				19	1	20

SEMESTER 4

No	Code		Subject	T	P	J
1	FIS	208	Laboratory Management	2	0	2
2	FIS	209	Optics	2	0	2
3	FIS	210	Mathematics For Quantum	3	0	3
4	FIS	205	Physics Learning Media	2	1	3
5	FIS	212	Quantum Physics	2	0	2
6	FIS	214	Physics Learning Evaluation	3	0	3
7	FIS	215	Physics Curriculum Review	3	0	3
8	FIS	216	Modern Physics	2	0	2
				20	0	20

SEMESTER 5

No	Code		Subject	T	P	J
1	MKU	300	Entrepreneurship	1	1	2
2	FIS	305	Computational Physics	2	1	3
3	FIS	304	Introduction to Solids Physics	2	0	2
4	FIS	301	Magnetic Electricity	4	0	4
5	FIS		Elective Courses 1-5	9		9
				18	2	20

SEMESTER 6

No	Code		Subject	T	P	J
1	FIS	302	Educational Research Methodology	2	1	3
2	FIS	303	Introduction to Core Physics	2	0	2
3	FIS	306	Micro Learning	2	0	2
4	FIS		Elective Courses 6-11	12	0	13
				20	0	20

SEMESTER 7

No	Code		Subject	T	P	J
1	MKU	400	Community Service Program	0	4	4
2	FIS	401	Peng. School Field	0	4	4
3	FIS	402	Physics Seminar	2	0	2
4	FIS		Elective Courses 12-17	10	0	10
				12	8	20

SEMESTER 8

No	Code		Subject	T	P	J
1	Code	413	Thesis	0	6	6

Notes
For the opportunity for students to study outside the study program, students are given the freedom to contract lectures in accordance with the activities taken, as long as the courses taken can be recognized as elective courses

Elective courses
433. High school physics
434. English for physics teachers
435. High School Physics Practicum Study
436. Development of Teaching Materials
437. Alternative Assessment
438. Web-Based Learning Media
439. Android-Based Learning Media
440. Distance Learning Physics
441. Mixed Physics Learning
442. Disaster Safe Education
534. Earth and Space Science
535. Research Statistics
536. Review the Results of International Studies
537. Physics Learning Innovation
538. Physics Experiment Development
539. Hybrid physics learning
540. Conservation of natural resources
541. High School Physics
542. Item response theory
543. Education measurement
544. Physics education case studies
545. Application of Technology in Physics Pemb
546. Physics Teacher Professional Development
547. Integrated IPA
548. Pemb. Science and technology thematic
549. ICT-based assessment
550. Management of educational institutions
551. Long life education
552. Bukit Barisan Volcanology
553. Introduction to Oceanography
554. Bukit Barisan Geothermal Study
555. Electrical Circuit Analysis
556. Arduino programming
557. Arduino Interface
558. Smart Sensor
559. Quantun Transport
560. Bilinear system
561. Quantum mechanics
562. Quantum bit system
563. Quantum optics
564. Quantum Control
565. Linear algebra and mixed notation
566. Simulation and quantum capital
567. Algorithms and programming
568. Numerical analysis
569. Hydrometerological hazards
570. Climate change adaptation and mitigation
571. Earthquakes, tsunamis and volcanic eruptions merapi
572. Floods and landslides

C. Plans for Implementation of the Right to Learn in Different Study Programs Outside PT

SEMESTER 1

No	Code		Subject	T	P	J
1	MKU	101	Religious education	1	2	3
2	MKU	102	Pancasila	1	1	2
3	MKU	105	English	1	1	2
4	MKU	106	Computer And Programming (Coding)	1	2	3
5	MFA	102	Student Development	3	0	3
6	FIS	101	Classical Mechanics	3	0	3
7	FIS	102	Differentiation And Integral For Physics	4	0	4
				14	6	20

SEMESTER 2

No	Code		Subject	T	P	J
1	MKU	103	Indonesian	1	2	3
2	MKU	104	Citizenship	1	1	2
3	MFA	101	Philosophy of Education	2	0	2
4	MFA	103	Curriculum And Learning	2	0	2
5	MFA	104	Education Management	2	0	2
6	FIS	102	Particle System Mechanics	4	0	4
7	FIS	104	Physics Experiment	0	2	2
8	FIS	105	Math For Mechanics	4	0	4
				16	5	21

3RD SEMESTER

No	Code		Subject	T	P	J
1	FIS	201	Electronics	3	0	3
2	FIS	217	Electronics Practicum	0	1	1
3	FIS	202	Mechanics	3	0	3
4	FIS	203	Thermodynamics	3	0	3
5	FIS	204	Wave	2	1	3
6	FIS	206	Physics Learning Strategy	2	0	2
7	FIS	207	Physics Lesson Planning	2	0	2
8	FIS	211	Hydrodynamics	3	0	3
				19	1	20

SEMESTER 4

No	Code		Subject	T	P	J
1	FIS	208	Laboratory Management	2	0	2
2	FIS	209	Optics	2	0	2
3	FIS	210	Mathematics For Quantum	3	0	3
4	FIS	205	Physics Learning Media	2	1	3
5	FIS	212	Quantum Physics	2	0	2
6	FIS	214	Physics Learning Evaluation	3	0	3
7	FIS	215	Physics Curriculum Review	3	0	3
8	FIS	216	Modern Physics	2	0	2
				20	0	20

SEMESTER 5

No	Code		Subject	T	P	J
1	MKU	300	Entrepreneurship	1	1	2
2	FIS	305	Computational Physics	2	1	3
3	FIS	304	Introduction to Solids Physics	2	0	2
4	FIS	301	Magnetic Electricity	4	0	4
5	FIS		Elective Courses 1-5	9		9
				18	2	20

SEMESTER 6

No	Code		Subject	T	P	J
1	FIS	302	Educational Research Methodology	2	1	3
2	FIS	303	Introduction to Core Physics	2	0	2
3	FIS	306	Micro Learning	2	0	2
4	FIS		Elective Courses 6-11	12	0	13
				20	0	20

SEMESTER 7

No	Code		Subject	T	P	J
1	MKU	400	Community Service Program	0	4	4
2	FIS	401	Peng. School Field	0	4	4
3	FIS	402	Physics Seminar	2	0	2
4	FIS		Elective Courses 12-17	10	0	10
				12	8	20

SEMESTER 8

No	Code		Subject	T	P	J
1	Code	413	Thesis	0	6	6

Notes
For the opportunity for students to study outside the study program, students are given the freedom to contract lectures in accordance with the activities taken, as long as the courses taken can be recognized as elective courses

Elective courses
443. High school physics
444. English for physics teachers
445. High School Physics Practicum Study
446. Development of Teaching Materials
447. Alternative Assessment
448. Web-Based Learning Media
449. Android-Based Learning Media
450. Distance Learning Physics
451. Mixed Physics Learning
452. Disaster Safe Education
574. Earth and Space Science
575. Research Statistics
576. Review the Results of International Studies
577. Physics Learning Innovation
578. Physics Experiment Development
579. Hybrid physics learning
580. Conservation of natural resources
581. High School Physics
582. Item response theory
583. Education measurement
584. Physics education case studies
585. Application of Technology in Physics Pemb
586. Physics Teacher Professional Development
587. Integrated IPA
588. Pemb. Science and technology thematic
589. ICT-based assessment
590. Management of educational institutions
591. Long life education
592. Bukit Barisan Volcanology
593. Introduction to Oceanography
594. Bukit Barisan Geothermal Study
595. Electrical Circuit Analysis
596. Arduino programming
597. Arduino Interface
598. Smart Sensor
599. Quantun Transport
600. Bilinear system
601. Quantum mechanics
602. Quantum bit system
603. Quantum optics
604. Quantum Control
605. Linear algebra and mixed notation
606. Simulation and quantum capital
607. Algorithms and programming
608. Numerical analysis
609. Hydrometerological hazards
610. Climate change adaptation and mitigation
611. Earthquakes, tsunamis and volcanic eruptions
merapi
612. Floods and landslides
613. Capital and disaster simulation

D. Implementation Plan for the Right to Study Outside PT

SEMESTER 1

No	Code		Subject	T	P	J
1	MKU	101	Religious education	1	2	3
2	MKU	102	Pancasila	1	1	2
3	MKU	105	English	1	1	2
4	MKU	106	Computer And Programming (Coding)	1	2	3
5	MFA	102	Student Development	3	0	3
6	FIS	101	Classical Mechanics	3	0	3
7	FIS	102	Differentiation And Integral To Physics	4	0	4
				14	6	20

SEMESTER 2

No	Code		Subject	T	P	J
1	MKU	103	Indonesian	1	2	3
2	MKU	104	Citizenship	1	1	2
3	MFA	101	Philosophy of Education	2	0	2
4	MFA	103	Curriculum And Learning	2	0	2
5	MFA	104	Education Management	2	0	2
6	FIS	102	Particle System Mechanics	4	0	4
7	FIS	104	Physics Experiment	0	2	2
8	FIS	105	Math For Mechanics	4	0	4
				16	5	21

3RD SEMESTER

No	Code		Subject	T	P	J
1	FIS	201	Electronics	3	0	3
2	FIS	217	Electronics Practicum	0	1	1
3	FIS	202	Mechanics	3	0	3
4	FIS	203	Thermodynamics	3	0	3
5	FIS	204	Wave	2	1	3
6	FIS	206	Physics Learning Strategy	2	0	2
7	FIS	207	Physics Lesson Planning	2	0	2
8	FIS	211	Hydrodynamics	3	0	3
				19	1	20

SEMESTER 4

No	Code		Subject	T	P	J
1	FIS	208	Laboratory Management	2	0	2
2	FIS	209	Optics	2	0	2
3	FIS	210	Mathematics For Quantum	3	0	3
4	FIS	205	Physics Learning Media	2	1	3
5	FIS	212	Quantum Physics	2	0	2
6	FIS	214	Physics Learning Evaluation	3	0	3
7	FIS	215	Physics Curriculum Review	3	0	3
8	FIS	216	Modern Physics	2	0	2
				20	0	20

SEMESTER 5

No	Code		Subject	T	P	J
1	MKU	300	Entrepreneurship	1	1	2
2	FIS	305	Computational Physics	2	1	3
3	FIS	304	Introduction to Solids Physics	2	0	2
4	FIS	301	Magnetic Electricity	4	0	4
5	FIS		Elective Courses 1-5	9		9
				18	2	20

SEMESTER 6

No	Code		Subject	T	P	J
1	FIS	302	Educational Research Methodology	2	1	3
2	FIS	303	Introduction to Core Physics	2	0	2
3	FIS	306	Micro Learning	2	0	2
4	FIS		Elective Courses 6-11	12	0	13
				20	0	20

SEMESTER 7

No	Code		Subject	T	P	J
1	MKU	400	Community Service Program	0	4	4
2	FIS	401	Peng. School Field	0	4	4
3	FIS	402	Physics Seminar	2	0	2
4	FIS		Elective Courses 12-17	10	0	10
				12	8	20

SEMESTER 8

No	Code		Subject	T	P	J
1	Code	413	Thesis	0	6	6

Notes
For the opportunity for students to study outside the study program, students are given the freedom to contract MT lectures according to the activities taken, as long as the courses h taken can be recognized as elective courses.

Elective courses
453. High school physics
454. English for physics teachers
455. High School Physics Practicum Study
456. Development of Teaching Materials
457. Alternative Assessment
458. Web-Based Learning Media
459. Android-Based Learning Media
460. Distance Learning Physics
461. Mixed Physics Learning
462. Disaster Safe Education
614. Earth and Space Science
615. Research Statistics
616. Review the Results of International Studies
617. Physics Learning Innovation
618. Physics Experiment Development
619. Hybrid physics learning
620. Conservation of natural resources
621. High School Physics
622. Item response theory
623. Education measurement
624. Physics education case studies
625. Application of Technology in Physics Pemb
626. Physics Teacher Professional Development
627. Integrated IPA
628. Pemb. Science and technology thematic
629. ICT-based assessment
630. Management of educational institutions
631. Long life education
632. Bukit Barisan Volcanology
633. Introduction to Oceanography
634. Bukit Barisan Geothermal Study
635. Electrical Circuit Analysis
636. Arduino programming
637. Arduino Interface
638. Smart Sensor
639. Quantun Transport
640. Bilinear system
641. Quantum mechanics
642. Quantum bit system
643. Quantum optics
644. Quantum Control
645. Linear algebra and mixed notation
646. Simulation and quantum capital
647. Algorithms and programming
648. Numerical analysis
649. Hydrometerological hazards
650. Climate change adaptation and mitigation
651. Earthquakes, tsunamis and volcanic eruptions
merapi
652. Floods and landslides
653. Capital and disaster simulation

List of Recognition Elective Courses According to Recommended MBKM Activity Options

Total	Not MBKM	Assistance in educational units	Study	Project in the village
		SMA/SMK		
1. High school physics 2. English for physics teachers 3. High School Physics Practicum Study 4. Development of Teaching Materials 5. Alternative Assessment 6. Web-Based Learning Media 7. Android-Based Learning Media 8. Distance Learning Physics 9. Mixed Physics Learning 10. Disaster Safe Education 11. Earth and Space Science 12. Research Statistics 13. Review the Results of International Studies 14. Physics Learning Innovation 15. Physics Experiment Development 16. Hybrid physics learning 17. Conservation of natural resources 18. High School Physics 19. Item response theory 20. Education measurement 21. Physics education case studies 22. Technology Applications in Physics Learning 23. Physics Teacher Professional Development 24. Integrated IPA 25. Pemb. Science and technology thematic 26. ICT-based assessment 27. Management of educational institutions 28. Long life education 29. Bukit Barisan Volcanology 30. Introduction to Oceanography 31. Bukit Barisan Geothermal Study 32. Electrical Circuit Analysis 33. Arduino programming 34. Arduino Interface 35. Smart Sensor 36. Quantun Transport 37. Bilinear system 38. Quantum mechanics 39. Quantum bit system 40. Quantum optics 41. Quantum Control 42. Linear algebra and mixed notation 43. Simulation and quantum capital	1. High school physics 2. English for physics teachers 3. High School Physics Practicum Study 4. DevelopmentT eaching materials 5. Alternative Assessment 6. Media Web Based Learning 7. Media Android Based Learning 8. Distance Learning Physics 9. Mixed Physics Learning 10. Disaster Safe Education 11. Earth and Space Science 12. Research Statistics 13. Review the Results of International Studies 14. Innovation Physics Learning	1. High school physics 2. High School Physics Practicum Study 3. DevelopmentPhysics Experiment 4. Alternative Assessment 5. Disaster Safe Education 6. Web-Based Learning Media 7. Android-Based Learning Media 8. Earth and Space Science 9. Research Statistics 10. Review the Results of International Studies 11. Development of Teaching Materials 12. Physics Learning Innovation 13. Distance Learning Physics 14. Mixed Physics Learning 15. Hybrid physics learning 16. Conservation of natural resources 17. Item response theory 18. English for physics teachers 19. Education measurement 20. Bukit Barisan Volcanology 21. Introduction to Oceanography 22. Bukit Barisan Geothermal Study 23. Arduino programming 24. Arduino Interface 25. Smart Sensor 26. Electrical Circuit Analysis 27. Physics education case studies 28. Technology Applications in Physics Learning 29. Physics Teacher Professional Development 30. ICT-based assessment	1. Physics Experiment Development 2. Alternative Assessment 3. Disaster Safe Education 4. Web-Based Learning Media 5. Android-Based Learning Media 6. High school physics 7. Earth and Space Science 8. High School Physics Practicum Study 9. Research Statistics 10. Review the Results of International Studies 11. Development of Teaching Materials 12. Physics Learning Innovation 13. Distance Learning Physics 14. Mixed Physics Learning 15. Hybrid physics learning 16. Conservation of natural resources 17. High School Physics 18. Item response theory 19. English for physics teachers 20. Education measurement 21. Physics education case studies 22. Technology Applications in Physics Learning 23. Physics Teacher Professional Development 24. Integrated IPA 25. Pemb. Science and technology thematic 26. ICT-based assessment 27. Management of educational institutions 28. Long life education 29. Bukit Barisan Volcanology 30. Introduction to Oceanography 31. Bukit Barisan Geothermal Study 32. Electrical Circuit Analysis 33. Arduino programming 34. Arduino Interface 35. Smart Sensor 36. Quantun Transport 37. Bilinear system 38. Quantum mechanics 39. Quantum bit system 40. Quantum optics 41. Quantum Control 42. Linear algebra and mixed notation 43. Simulation and quantum capital	1. Disaster Safe Education 2. High school physics 3. Review the Results of International Studies 4. Conservation of natural resources 5. Physics education case studies 6. Technology Applications in Physics Learning 7. Management of educational institutions *8. Long life education* 9. Electrical Circuit Analysis 10. Arduino programming 11. Arduino Interface 12. Smart Sensor 13. Climate change adaptation and mitigation 14. Capital and disaster simulation

44. Algorithms and programming 45. Numerical analysis 46. Hydrometerological hazards 47. Climate change adaptation and mitigation 48. Earthquakes, tsunamis and volcanic eruptions 49. Floods and landslides 50. Capital and disaster simulation			44. Algorithms and programming 45. Numerical analysis 46. Hydrometerological hazards 47. Climate change adaptation and mitigation 48. Earthquakes, tsunamis and volcanic eruptions 49. Floods and landslides 50. Capital and disaster simulation	

List of Recognition Elective Courses According to the Choice of Certain MBKM Activities

(Only Opened According to the Results of the Study Program Mbkm Team)

Total	Assistance in educational units		Humanity Project	Entrepreneurship	Independent Study	Apprenticeship
	JUNIOR HIGH SCHOOL	SD				
1. High school physics 2. English for physics teachers 3. High School Physics Practicum Study 4. Development of Teaching Materials 5. Alternative Assessment 6. Web-Based Learning Media 7. Android-Based Learning Media 8. Distance Learning Physics 9. Mixed Physics Learning 10. Disaster Safe Education 11. Earth and Space Science 12. Research Statistics 13. Review the Results of International Studies 14. Physics Learning Innovation 15. Physics Experiment Development 16. Hybrid physics learning 17. Conservation of natural resources 18. High School Physics 19. Item response theory 20. Education measurement 21. Physics education case studies 22. Technology Applications in Physics Learning	1. Integrated IPA 2. Physics Experiment Development 3. Alternative Assessment 4. Disaster Safe Education 5. Web-Based Learning Media 6. Android-Based Learning Media 7. Earth and Space Science 8. Research Statistics 9. Review the Results of International Studies 10. Development of Teaching Materials 11. Physics Learning Innovation 12. Distance Learning Physics 13. Mixed Physics Learning 14. Hybrid physics learning 15. Conservation of natural resources 16. Item response theory 17. English for physics teachers 18. Measurement education 19. Bukit Barisan Volcanology 20. Introduction to Oceanography 21. Bukit Barisan Geothermal Study	1. Integrated IPA 2. Pemb. Science and technology thematic 3. Physics Experiment Development 4. Alternative Assessment 5. Disaster Safe Education 6. Web-Based Learning Media 7. Android-Based Learning Media 8. Earth and Space Science 9. Research Statistics 10. Review the Results of International Studies 11. Development of Teaching Materials 12. Physics Learning Innovation 13. Distance Learning Physics 14. Mixed Physics Learning 15. Hybrid physics learning 16. Conservation of natural resources 17. Item response theory 18. English for physics teachers 19. Measurement education 20. Bukit Barisan Volcanology 21. Introduction to	1. Disaster Safe Education 2. Conservation of natural resources 3. Physics education case studies 4. Technology Applications in Physics Learning 5. Management of educational institutions 6. Long life education 7. Bukit Barisan Volcanology 8. Introduction to Oceanography 9. Bukit Barisan Geothermal Study 10. Electrical Circuit Analysis 11. Arduino programming 12. Arduino Interface 13. Smart Sensor 14. Danger hydrometerological 15. Climate change adaptation and mitigation 16. Earthquakes, tsunamis and volcanic eruptions 17. Floods and landslides 18. Capital and disaster simulation	1. Review the Results of International Studies 2. Management of educational institutions 3. Web-Based Learning Media 4. Android-Based Learning Media 5. Physics education case studies 6. Technology Applications in Physics Learning 7. Electrical Circuit Analysis 8. Arduino programming 9. Arduino Interface 10. Smart Sensor 11. High School Physics Practicum Study 12. Physics Experiment Development	1. Physics Experiment Development 2. Alternative Assessment 3. Disaster Safe Education 4. Web-Based Learning Media 5. Android-Based Learning Media 6. High school physics 7. Earth and Space Science 8. High School Physics Practicum Study 9. Research Statistics 10. Review the Results of International Studies 11. Development of Teaching Materials 12. Physics Learning Innovation 13. Distance Learning Physics 14. Mixed Physics Learning 15. Hybrid physics learning 16. Conservation of natural resources 17. High School Physics 18. Item response theory 19. English for physics teachers 20. Education measurement 21. Physics education case studies 22. Technology Applications in Physics Learning 23. Physics Teacher	1. Physics Experiment Development 2. Alternative Assessment 3. Disaster Safe Education 4. Web-Based Learning Media 5. Android-Based Learning Media 6. High school physics 7. Earth and Space Science 8. High School Physics Practicum Study 9. Research Statistics 10. Review the Results of International Studies 11. Development of Teaching Materials 12. Physics Learning Innovation 13. Distance Learning Physics 14. Mixed Physics Learning 15. Hybrid physics learning 16. Conservation of natural resources 17. High School Physics 18. Item response theory 19. English for physics teachers 20. Education measurement 21. Physics education case studies 22. Technology Applications in Physics Learning 23. Physics Teacher Professional

23. Physics Teacher Professional Development 24. Integrated IPA 25. Pemb. Thematic IPA and	22. Arduino programming 23. Arduino Interface 24. Smart Sensor 25. Circuit Analysis	Oceanography 22. Bukit Barisan Geothermal Study 23. Arduino programming 24. Arduino Interface			Professional Development 24. Integrated IPA 25. Pemb. Science and technology thematic	Development 24. Integrated IPA 25. Pemb. Science and technology thematic 26. ICT-based assessment

technology 26. ICT-based assessment 27. Management of educational institutions 28. Long life education 29. Bukit Barisan Volcanology 30. Introduction to Oceanography 31. Bukit Barisan Geothermal Study 32. Electrical Circuit Analysis 33. Arduino programming 34. Arduino Interface 35. Smart Sensor 36. Quantun Transport 37. Bilinear system 38. Quantum mechanics 39. Quantum bit system 40. Quantum optics 41. Quantum Control 42. Linear algebra and mixed notation 43. Simulation and quantum capital 44. Algorithms and programming 45. Numerical analysis 46. Hydrometerological hazards 47. Climate change adaptation and mitigation 48. Earthquakes, tsunamis and volcanic eruptions 49. Floods and landslides 50. Capital and disaster simulation	Electricity 26. Physics education case studies 27. Technology Applications in Physics Learning 28. Physics Teacher Professional Development 29. ICT-based assessment	25. Smart Sensor 26. Electrical Circuit Analysis 27. Physics education case studies 28. Technology Applications in Physics Learning 29. Physics Teacher Professional Development 30. ICT-based assessment			26. ICT-based assessment 27. Management of educational institutions 28. Long life education 29. Bukit Barisan Volcanology 30. Introduction to Oceanography 31. Bukit Barisan Geothermal Study 32. Electrical Circuit Analysis 33. Arduino programming 34. Arduino Interface 35. Smart Sensor 36. Quantun Transport 37. Bilinear system 38. Quantum mechanics 39. Quantum bit system 40. Quantum optics 41. Quantum Control 42. Linear algebra and mixed notation 43. Simulation and quantum capital 44. Algorithms and programming 45. Numerical analysis 46. Hydrometerological hazards 47. Climate change adaptation and mitigation 48. Earthquakes, tsunamis and volcanic eruptions 49. Floods and landslides 50. Capital and disaster simulation	27. Management of educational institutions 28. Long life education 29. Bukit Barisan Volcanology 30. Introduction to Oceanography 31. Bukit Barisan Geothermal Study 32. Electrical Circuit Analysis 33. Arduino programming 34. Arduino Interface 35. Smart Sensor 36. Quantun Transport 37. Bilinear system 38. Quantum mechanics 39. Quantum bit system 40. Quantum optics 41. Quantum Control 42. Linear algebra and mixed notation 43. Simulation and quantum capital 44. Algorithms and programming 45. Numerical analysis 46. Hydrometerological hazards 47. Climate change adaptation and mitigation 48. Earthquakes, tsunamis and volcanic eruptions 49. Floods and landslides 50. Capital and disaster simulation

MANAGEMENT AND MECHANISM OF CURRICULUM IMPLEMENTATION

A. Curriculum Implementation Management

Management of learning in the MBKM curriculum of physics education study programs includes

1. Planning

   Learning planning is entirely the responsibility of the supporting lecturer, while planning is carried out in the form of RPS (semester learning plans). For students who take part in MBKM activities, the description of the activities will adjust to the recognized courses. With reference to the description of activities determined by the teaching lecturer. The recommended activities are assistance in SMA/SMA/MA, research and village projects, while other activities will be opened according to the decision of the MBKM team meeting
2. Implementation

   The implementation of the MBKM curriculum in the Physics Education Study Program is placed in 5,6,7 semesters with details
   a. 5th semester

      in this semester students can do MBKM with activities adjusting to the contracted courses according to the description in point 8
   b. 6th semester

      in this semester students choose 20 credits from elective courses by adjusting to the form of MBKM activities to be taken
   c. 7th semester

      in this semester students take part in MBKM by taking the form of assistance in educational units. The contracted courses include KKN, PLP, and physics seminars as well as 10 credits of elective courses. Elective courses can adjust according to the activities to be carried out.

   For the form of MBKM activities in the form of student exchanges. MBKM activities can only be participated by students with a min GPA of 3.5.

   The implementation of learning in this curriculum follows the description of the activities as listed above (distribution of courses, weights and lesson plans). Both regarding implementation and at the evaluation stage. For courses that are recognized as MBKM activities, each lecturer in charge of the course will provide a description of the activities to be carried out with the technical implementation of the activities referring to the provisions of the University, Faculty and Study Program.
3. Control

   The control of learning activities is fully the responsibility of the MBKM Study Program Team, which is chaired by the study program coordinator by involving course supervisors and MBKM supervisors. Problem control can also refer to the agreed MOU/MOA
4. Monitoring and evaluation

   Monitoring and evaluation of activities is fully subject to the agreed technical activities and set forth in the technical guidelines for the implementation of the MBKM and following the RPS made by the supervising lecturer for those who are not recognized in the MBKM activities
5. Activity reporting

   Reporting on activities involves partners, supporting lecturers, supervisors and study programs. The technical instructions for reporting activities follow the University or Faculty guidelines.

B. Curriculum Implementation Mechanism

In carrying out MBKM activities, study programs, faculties, and universities are strongly required to establish cooperation regarding student activities at partner agencies. Cooperation with partners must refer to the profile of the study program graduates and learning outcomes and course achievements. Cooperation that does not relate to these matters cannot be followed up. To limit the description of activities, prevent confusion in converting values and minimize various interpretations by PA lecturers in determining contract permits. Then the MOA made must at least describe

1. Activities to be carried out during MBKM in partner agencies
2. Activity implementation period
3. Names of courses and credits that will be converted or equalized

For this submission process, a step-by-step procedure for submitting an MOU/MOA is required. The stages of submission carried out are:

1. MOA submissions can be initiated by students, or lecturers through study programs
2. The initiation of the submission is submitted to the study program, and the head of the study program submits to the faculty (Vice Dean for Student Affairs) related to the MOA.
3. Study Program
4. The MOA is proposed by the Deputy Dean 3 in coordination with the KSLI or a unit appointed by the university.

The signed MOA will be uploaded to the fkip or unib web system so that it can be easily accessed and viewed by all PA lecturers, head of study programs, and students. The management of the MOU/MOA is submitted to an institution appointed by the University through a faculty proposal under the coordination of the Deputy dean 3.

Activity duration calculation

Learning activities outside Bengkulu University can be carried out for a maximum of 2 semesters equivalent to 40 credits. Credit recognition is also based on the duration of learning activities. The learning activity equivalent to 1 credit is 170 minutes/week, (Directorate General of Higher Education, 2020). Thus, learning activities of 20 credits can be calculated equivalently or 3400 minutes/week or 56 hours, 40 minutes a week.

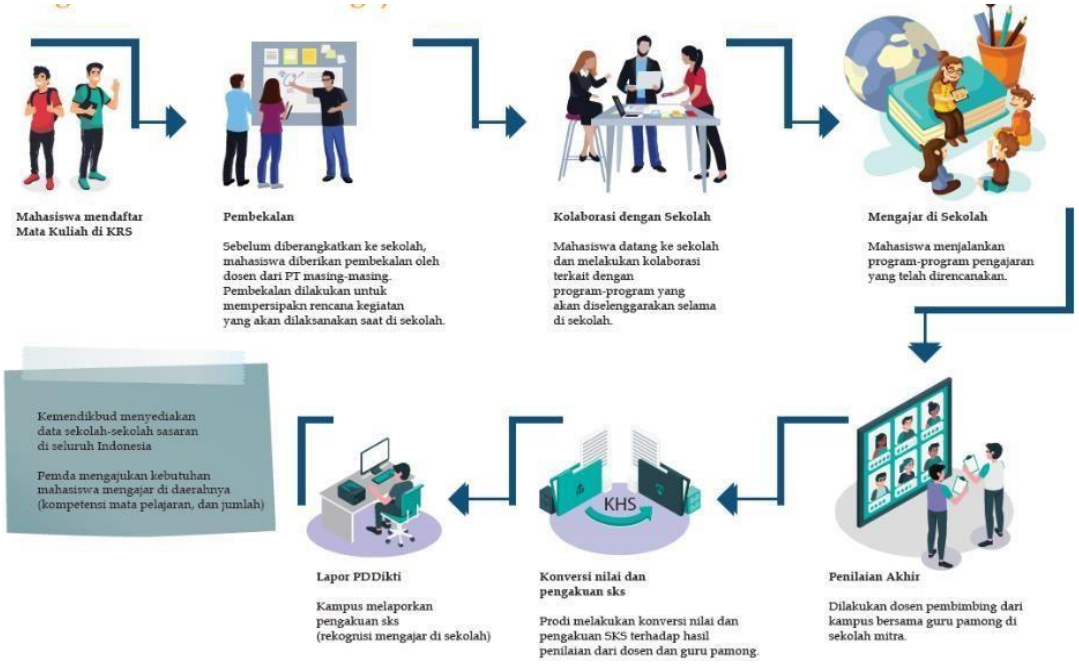
The possibility to contract 20 credits is adjusted to the working hours of MBKM activities. For example, students provide assistance in PAUD education units with working hours of only 5 hours / day, with 5 working days, the total duration of the activity is only 5 hours x 60 minutes x 5 days = 1500 minutes / week so that the courses that can be entered through this activity are only a maximum of 8 credits . In a case like this, it is necessary to discuss additional activities or changing the location of the activity taking into account the duration of the activity. For example, changing the destination to PAUD + Childcare or it can also be in the form of adding other activities.

MBKM activity implementation

system Activity Implementation

Flow

1. Assistance in educational units

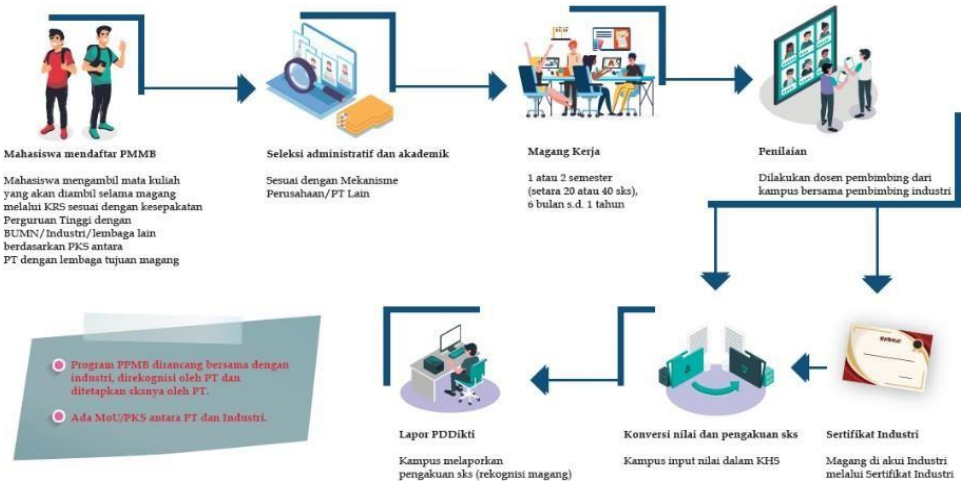


1. Registration mechanism for assistance activities in education units
   a. Students determine the agency where the assistance will be based on the list of institutions that collaborate with faculties, study programs, and PT.
   b. If the school in question is not registered, students report to the study program to propose an MOU/MOA to the faculty (this stage can be continued if there is an MOU/MOA, if the MOU/MOA is not reached, then students can choose to provide assistance to schools that are already working Same with faculty.
   c. Students discuss the possibility of taking assistance with the PA lecturer.
   d. The PA lecturer determines the courses that may be recognized through the achievement of CPL and CPMK.
   e. Students report to the head of study program related to MBKM activities.
2. supplies
   a. The study program determines student supervisors or student groups according to the rules that apply in the study program.
   b. The Study Program reports to recognized lecturers in the course
   c. The supervisor provides a list of MBKM activities/contracts and assessment instruments for recognizing MBKM activities to study programs
   d. Study Program forwards the instrument to the supervisor.
   e. Defending prior to assistance activities in the education unit is carried out by the faculty through the PPL unit by involving supervisors and MBKM participating students
3. Collaboration with the school
   Students go to school to discuss with the school regarding the program of activities to be carried out.

4. Teaching in schools
   Students teach at a predetermined school, with the duration of the activity according to the credits included in the activity. During the activity students are required to make a notebook or logbook

5. Evaluation
   a. Student performance evaluation (monev) during assistance is carried out by the agency through the assistant supervisor together with the supervisor.
   b. After completing the student assistance activities, submit activity reports to the study program
6. Conversion and recognition of ss
   a. The Study Program submits activity reports to recognized lecturers for courses to be assessed
   b. Supporting lecturers provide grades and input grades through the Unib academic/PAK system.
   c. Study program operators input in PDDIKTI

2. Apprenticeship

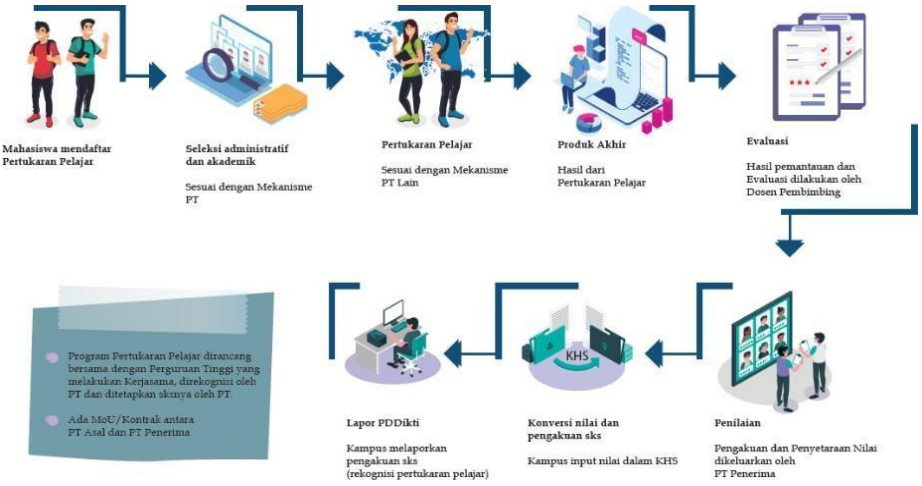


1. Apprentice registration mechanism
   a. Students determine the institution where the internship is held according to the list of institutions that work with faculties, study programs, and PT.
   b. Students discuss the possibility of taking an internship with the PA lecturer.
   c. The PA lecturer determines the courses that may be recognized through the achievement of CPL and CPMK.
   d. Students report to the head of study program related to MBKM activities.
2. Administration selection
   a. Administrative selection is carried out in the study program in advance according to the provisions of the study program and the agreement/MOU/MOA with the internship agency.
   b. Applications for internships will be sent by the faculty to the agency.
   c. The agency selects and determines apprentice supervisors
   d. The agency announces the accepted participants through an official letter to the faculty.
   e. The study program determines student supervisors or student groups according to the rules that apply in the study program.
   f. The Study Program reports to recognized lecturers in the course

g. Forgiveness lecturer provides a list of MBKM activities/contracts and recognition assessment instruments for MBKM activities to study programs
h. Study Program forwards the instrument to the supervisor.

3. Apprenticeship
   a. Students do internships in accordance with the MOU/MOA. the duration of the activity is in accordance with the credits included in the activity. During the activity students are required to make a notebook or logbook
4. Evaluation
   a. Performance assessment (monev) of students during the internship is carried out by the agency through the internship supervisor together with the supervisor.
   b. After completing the activity, students receive a certificate/statement of completion of the activity
   c. After completing the internship activities, students submit activity reports to the study program
   d. The Study Program submits activity reports to recognized lecturers for courses to be assessed
5. Conversion of scores and recognition of credits
   a. Supporting lecturers provide grades and input grades through the Unib academic/PAK system.
   b. Study program operators input in PDDIKTI

3. Student exchange

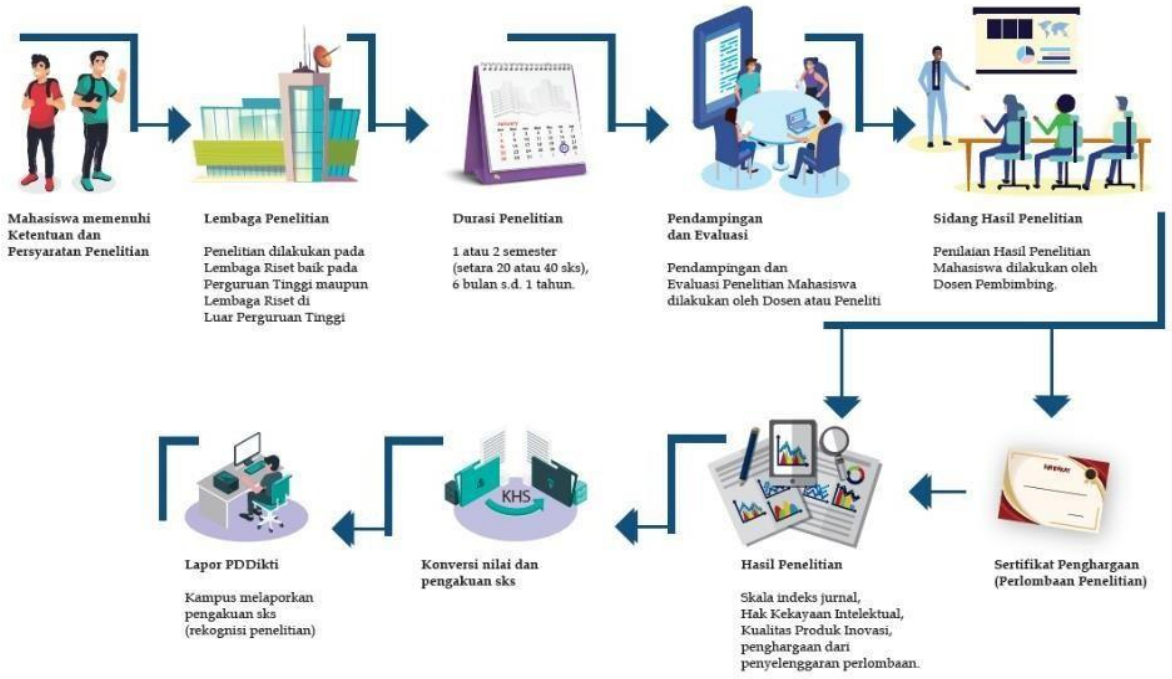


1. Student exchange registration mechanism
   a. Students determine the institution where the student exchange takes place according to the list of institutions that cooperate with faculties, study programs, and universities both domestically and abroad
   b. Students discuss the possibility of participating in student exchanges with PA lecturers.
   c. The PA lecturer determines the courses that may be recognized through the achievement of CPL and CPMK.
   d. Students report to the head of study program related to MBKM activities.
2. Administration selection
   a. Administrative selection is carried out in the study program in advance according to the provisions of the study program and the agreement/MOU/MOA with the destination institution.

b. Student exchange requests will be sent by the faculty to the destination institution. For exchanges abroad, the faculty cooperates with KSLI or other units that handle this.
c. The destination institution selects and determines mentors
d. The destination institution announces the accepted participants by means of an official letter to the faculty.
e. The study program determines student supervisors or student groups according to the rules that apply in the study program.
f. The Study Program reports to recognized lecturers in the course
g. The supervisor provides a list of MBKM activities/contracts and assessment instruments for recognizing MBKM activities to study programs
h. Study Program forwards the instrument to the supervisor.

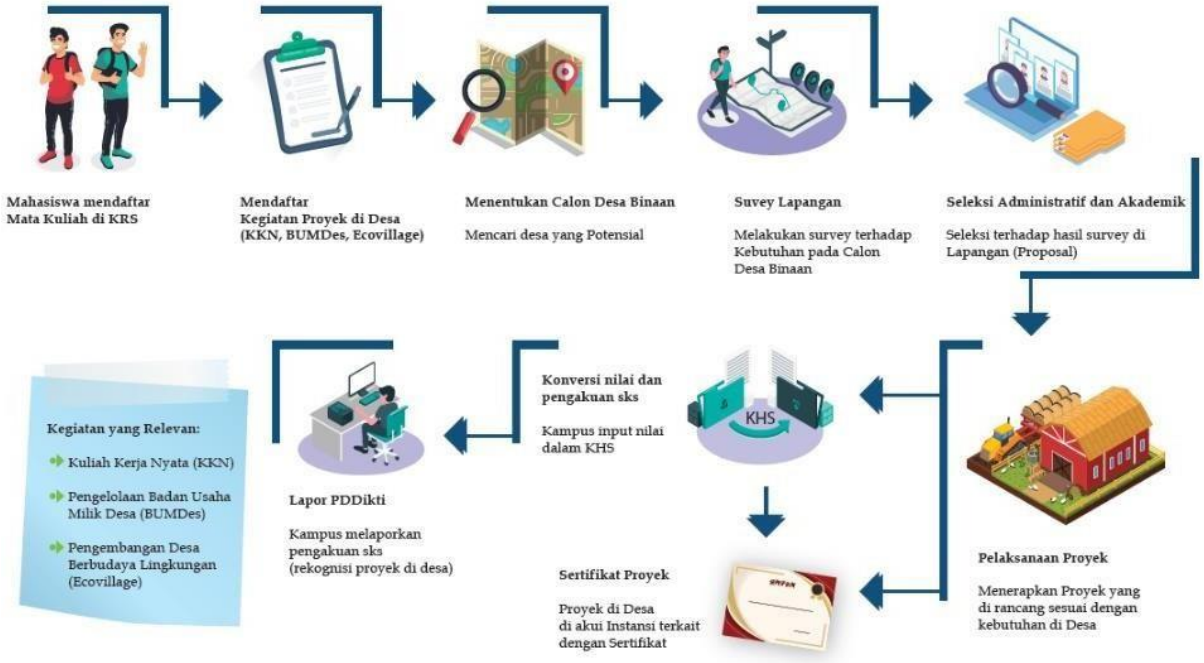
3. Student exchange
   a. Students conduct lectures according to the duration of the MOU/MOA. During activities students are required to make a notebook or logbook
4. The final product
   After completing the activities, students collect activity reports to the study program
5. Evaluation
   a. Student performance evaluation (monev) during student exchanges is carried out by the agency through the supervisor together with the supervisor.
6. Evaluation
   The values released by the destination institution are recognized and equalized by the study program or unit appointed by the Unib.
7. Conversion of scores and recognition of credits
   a. Supporting lecturers provide grades and input grades through the Unib academic/PAK system.
   b. Study program operators input in PDDIKTI

4. Research/research



1. Research/research activity registration mechanism
    a. The student decides to join the research group/lecturer umbrella research in the study program,
    b. Research group conducts administrative selection
    c. The research group determines the research institution according to the list of institutions that cooperate with the research group, faculty, study program, or PT.
    d. Students discuss the possibility of doing research with the PA lecturer.
    e. The PA lecturer determines the courses that may be recognized through the achievement of CPL and CPMK.
    f. Students report to the head of study program related to MBKM activities.
    g. Study Program sends Activity requests to partners
2. Research institutions
    a. The agency selects and determines the research supervisor
    b. The agency announces the accepted participants through an official letter to the faculty.
    c. The Study Program reports to recognized lecturers in the course
    d. The supervisor provides a list of MBKM activities/contracts and assessment instruments for recognizing MBKM activities to study programs
    e. Study Program forwards the instrument to the supervisor.
3. Study
    a. Students conduct research with the duration according to the MOU/MOA During the activity students are required to keep a notebook or logbook
4. Evaluation
    a. Performance assessment (monev) of students during the research is carried out by the agency through the supervisor together with the supervisor.
    b. After completing research activities, students make reports and carry out exams/trials/seminars/research results in the study program witnessed by partners
    c. Students publish with the provisions that the level of publication status (submitted/accepted/publish) is determined by the study program
    d. After done activity student get certificate/statement donecarry out activities
    e. Students collect activity reports to the study program
    f. Students get a certificate or statement from the partner
    g. The Study Program submits activity reports to recognized lecturers for courses to be assessed
5. Conversion of scores and recognition of credits
    a. Supporting lecturers provide grades and input grades through the Unib academic/PAK system.
    b. Study program operators input in PDDIKTI

5. Service activities in the village/village development/thematic KKN

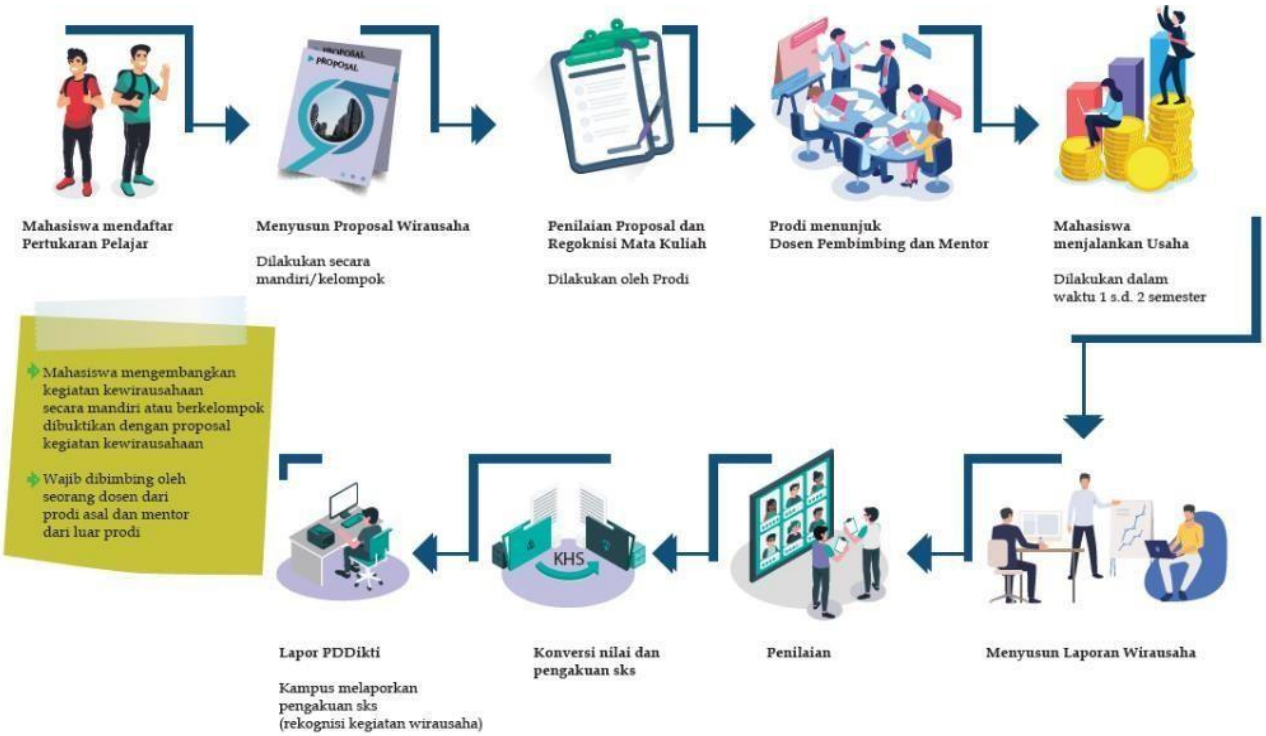


1. The mechanism for registering community service activities in the village/building a village/thematic KKN
   a. Students determine the village where the activity takes place according to the list of villages that work with faculties, study programs, and PT.
   b. Students get a list of needs/problems experienced by the village through direct surveys or by contacting village officials
   c. Students discuss the possibility of taking activities with the PA lecturer.
   d. The PA lecturer determines the courses that may be recognized through the achievement of CPL and CPMK as well as consideration of the results of a survey of problems in the village.
   e. Students report to the head of study program related to MBKM activities.
2. Administration selection
   a. Administrative selection is carried out in the study program first in accordance with the provisions of the study program and the agreement/MOU/MOA with the village/agency.
   b. Application activity build village will sent by faculty tovillage/agencies.
   c. The agency/village selects and determines activity supervisors
   d. The agency/village announces the accepted participants by means of an official letter to the faculty.
   e. The study program determines student supervisors or student groups according to the rules that apply in the study program.
   f. The Study Program reports to recognized lecturers in the course
   g. The supervisor provides a list of MBKM activities/contracts and assessment instruments for recognizing MBKM activities to study programs
   h. Study Program forwards the instrument to the supervisor.
3. Serving the village
   a. Students carry out village building activities in accordance with the MOU/MOA with a duration of time according to the credits included in the activity.

During the activity students are required to make a notebook or logbook

4. Evaluation
    a. Student performance evaluation (Monev) during activities is carried out by the agency through the activity supervisor together with the supervisor.
    b. After completing the activity, students receive a certificate/statement of completion of the activity
    c. After completing the activities, students collect activity reports to the study program
    d. The Study Program submits activity reports to recognized lecturers for courses to be assessed
5. Conversion of scores and recognition of credits
    a. Supporting lecturers provide grades and input grades through the Unib academic/PAK system.
    b. Study program operators input in PDDIKTI

6. Entrepreneurial activity

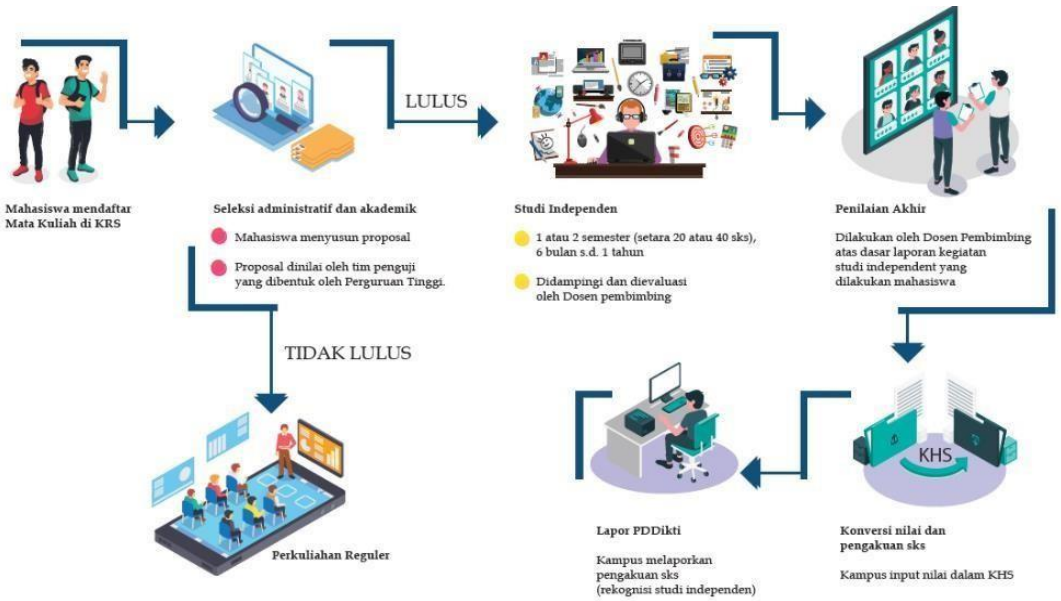


1. Mechanism of registration of entrepreneurial activity
    a. Students discuss the possibility of taking activities with the PA lecturer.
    b. PA lecturers determine courses that might be recognized through the achievement of CPL and CPMK
    c. Students report to the Head of Study Program related to MBKM activities as well as collect activity proposals.
2. Selection
    a. Administrative selection is carried out in the study program in advance in accordance with the provisions of the study program

b. Study Program appoints a team of lecturers to conduct selection/assessment of activity proposals
c. Study Program announces participant graduation
d. The study program determines student supervisors or student groups according to the rules that apply in the study program.
e. The Study Program reports to recognized lecturers in the course
f. The supervisor provides a list of MBKM activities/contracts and assessment instruments for recognizing MBKM activities to study programs
g. Study Program forwards the instrument to the supervisor.

3. Entrepreneurial activity
   a. Students carry out entrepreneurial activities with a duration of time according to the credits included in the activity. During activities students are required to make a notebook or logbook
4. Evaluation
   a. Student performance evaluation (Monev) during activities is carried out by the study program through the supervisor.
   b. After completing the activities, students collect activity reports to the study program
   c. The Study Program submits activity reports to recognized lecturers for courses to be assessed
5. Conversion of scores and recognition of credits
   a. Supporting lecturers provide grades and input grades through the Unib academic/PAK system.
   b. Study program operators input in PDDIKTI

7. Independent study activities



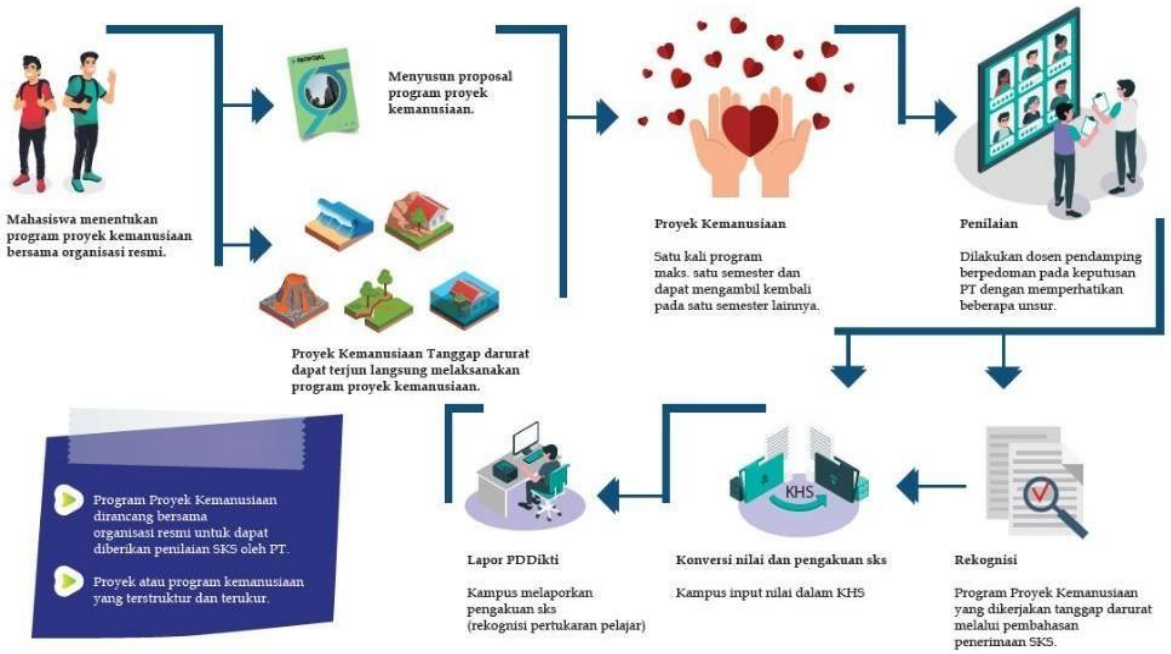
1. Mechanism for registering independent study activities
   a. Students discuss the possibility of taking activities with the PA lecturer.
   b. PA lecturers determine courses that might be recognized through the achievement of CPL and CPMK

c. Students report to the Head of Study Program related to MBKM activities as well as collect activity proposals.

2. Selection
   a. Administrative selection is carried out in the study program in advance in accordance with the provisions of the study program
   b. Study Program appoints a team of lecturers to conduct selection/assessment of activity proposals
   c. Study Program announces participant graduation
   d. The study program determines student supervisors or student groups according to the rules that apply in the study program.
   e. The Study Program reports to recognized lecturers in the course
   f. The supervisor provides a list of MBKM activities/contracts and assessment instruments for recognizing MBKM activities to study programs
   g. Study Program forwards the instrument to the supervisor.
3. Independent study activities
   a. Students carry out study activities with a duration of time according to the credits included in the activity. During activities students are required to make a notebook or logbook
4. Evaluation
   a. Student performance evaluation (Monev) during activities is carried out by the study program through the supervisor.
   b. After completing the activities, students collect activity reports to the study program
   c. The Study Program submits activity reports to recognized lecturers for courses to be assessed

5. Conversion of scores and recognition of credits
   a. Supporting lecturers provide grades and input grades through the Unib academic/PAK system.
   b. Study program operators input in PDDIKTI

8. Humanity activity



1. Humanitarian activity registration mechanism
   a. Students discuss the possibility of taking activities with the PA lecturer.
   b. PA lecturers determine courses that might be recognized through the achievement of CPL and CPMK
   c. Students report to the Head of Study Program related to MBKM activities as well as collect activity proposals.
   d. For an emergency response condition, no activity proposal is needed
2. Selection
   a. Administrative selection is carried out in the study program in advance in accordance with the provisions of the study program
   b. Study Program appoints a team of lecturers to carry out the selection/assessment of activity proposals, this stage is not carried out if it is in an emergency response condition
   c. Study Program announces participant graduation
   d. The study program determines student supervisors or student groups according to the rules that apply in the study program.
   e. The Study Program reports to recognized lecturers in the course
   f. The supervisor provides a list of MBKM activities/contracts and assessment instruments for recognizing MBKM activities to study programs
   g. Study Program forwards the instrument to the supervisor.
3. Humanitarian activities
   b. Students carry out humanitarian activities with a duration of time according to the credits included in the activity. During the activity students are required to make a notebook or logbook
4. Evaluation
   d. Student performance evaluation (Monev) during activities is carried out by the study program through the supervisor.
   e. After completing the activities, students collect activity reports to the study program
   f. The Study Program submits activity reports to recognized lecturers for courses to be assessed
5. Conversion of scores and recognition of credits
   a. Supporting lecturers provide grades and input grades through the Unib academic/PAK system.
   b. Study program operators input in PDDIKTI