CURRICULUM DOCUMENT FOR THE 2018 ACADEMIC YEAR: MASTER'S PROGRAM IN PHYSICS EDUCATION

GRADUATE SCHOOL
UNIVERSITAS PENDIDIKAN INDONESIA
2019

A. IDENTITY

1. Name of Study Program	Physics Education
2. Address	Jl. Dr. Setiabudhi 229
3. Regency/City	Bandung
4. Code Post	40154
5. Telephone Number	022.2004548
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7. E-mail address	fisika@upi.edu
8. Website address http://	http://fisika.upi.edu/ http://sps.upi.edu/id/magister-pendidikan physics/
9. Degree awarded	Master of Education (M.Pd.)
10. Year and Decree of Establishment	3406/UN40/DT/2012
11. Year and Accreditation Decree	119/SK/BAN-PT/Akred/M/III/2015 763/SK/BAN-PT/Akred/M/III/2018

B. PRODUCT LEADER

1. Nama	Dr. Taufik Ramlan Ramalis, M.Si
2. Position	Head of the study program
3. No. Assignment Decree	3537/ UN/KP/2017
4. Assignment Start Date	23 July 2019
5. Assignment Completion Date	23 July 2023
6. Contact Number of Head of Study Program	081320559215

C. RATIONAL

Curriculum development for the Master Program of Physics Education (here in after referred to as MP-PE) is viewed from the dimensions or educational model which relies on input, process and output. The first step taken by MP-PE in developing the curriculum was to conduct a needs analysis. Needs analysis is carried out by examining the vision and mission of the Indonesian University of Education, national and international work qualification needs, student characteristics, community and stakeholder needs and the development of science and technology. The results of the needs analysis are the basis for formulating the profile of MP-PE graduates. This graduate profile also refers to the UPI graduate profile.

The development of the MP-PE curriculum has been started since April 2018 by the curriculum development team, which consists of the Head of the MP-PE, SKM MP-PE, and GKM Education and Teaching, Department of Physics Education, FPMIPA UPI. MP-PE curriculum design/design based on learning outcomes (*learning outcomes-based curriculum design*), this curriculum design begins with CPPS which is derived from an analysis of the needs of stakeholders and graduate users and also refers to the KKNI which is outlined as Graduate Competency Standards (SKL) and formulated in the form of learning outcomes. The stages of curriculum design with curriculum design based on learning outcomes are adopted from the Kemristekdikti Higher Education Curriculum Guidelines. At the start of the review and evaluation of the curriculum, draft-1 of the 2018 curriculum was produced, with a total of 40 credits (sks)/60 ECTS. Draft-1 of the curriculum was prepared based on the analysis compiled in Table 1 below:

TABLE 1. CURRICULUM ANALYSIS

No	Analysis Source	Description	Change Plan
1	Implementation Curriculum in Lectures	There is some lecture material content *overlap*its too big with undergraduate study programs.	a. Rearrange the description of each course with pay attention to courses at undergraduate level b. Replacing courses with other courses or deleting certain courses.
2	National Policy (national standards higher education and KKNI), CP/LO as a result of the association's formulation profession and Policy	SPs level courses are too general, not specific enough regarding physics education. With the CP, the results of the formulation of professional associations are necessary	a. Identify competency standards and CP/LO that have not been accommodated by master's program curriculum physics education

No	Analysis Source	Description	Change Plan
	UPI regarding curriculum changes	analyzed the relationship between each course and CP	b. Adding new courses to accommodate competency standards and CP or integrate on existing courses c. Delete courses that do not support CP/LO at all
3	Need *Stakeholder* (Alumni and graduate users)	Has accommodated some needs *stakeholder*, but it needs to be all-encompassing need.	a. Identify skills and knowledge Teachers are needed in the field but not yet provided in courses b. Adding new courses or integrating existing courses to accommodate knowledge and skills teachers are needed in the field
4	Development of science and Technology	Not all of the courses at MP-PE are complete adapt to developments in science knowledge and technology	a. Revise the curriculum structure, description and syllabus for each course to adapt with developments in science and technology. b. Update RPS for each course
5	Globalization (21st century skills)	21st century skills will be included in the school curriculum middle and elementary school. The MP-PE curriculum has not equipped graduates with knowledge teaches 21st century skills.	a. 21st century skills will be included as one of the subjects in the course Skills Lecture (MKK) Study Program. b. Accommodating ESD (*Education for Sustainability Education*) c. Review of courses related to 21st century skills

Then on August 4 2018, the Master of Physics Education Study Program invited all lecturers to discuss draft 1 of the 2018 curriculum. From this meeting, draft 2 of the 2018 curriculum was produced, the curriculum structure changed slightly from before to a total of 38 credits.

With the issuance of UPI Chancellor's Regulation No. 12369/UN40/HK/2018 concerning Guidelines for Curriculum Development for the 2018 UPI Study Program and No. 12372/UN40/HK/2018 concerning Basic Provisions for 2018 UPI Curriculum Development dated December 6 2018, so on January 18 2018 MP-PE invited the curriculum development

team again to review the draft-2 curriculum. At the meeting, the conformity of the draft 2 curriculum with the two Chancellor's regulations, as well as additions, was discussed again characteristics of the industrial revolution 4.0, resulting in the 2018 curriculum structure listed in this document, with a total of 37 credits (sks) or 55,5 ECTS.

D. STUDY PROFILE

The Physics Education Master Program was established on May 24 2012 through Decree No. 3406/UN40/DT/2012. The name of the Physics Education study program is in accordance with the nomenclature as stated in Minister of Research and Technology Decree No. 257/M/KPT/2017 Concerning Names of Study Programs in Higher Education. Since March 2018 MP-PE has been accredited by BAN-PT with an accredited rating of A, through Decree No. 763/SK/BAN PT/Akred/M/IIII/2018. To date (December 2018) 236 people have graduated. MP-PE SPs UPI aims to prepare students to become reliable planners, developers, thinkers and/or practitioners in the field of Physics education. Apart from that, graduates of the Physics Education Master's study program are expected to present themselves as individuals who have high integrity, are open and responsive to developments in science and technology, and continuously motivate themselves as scientists. Formulation of graduate competencies through an FGD process with the academic community and alumni as well as graduate users, so that they can comprehensively meet the needs of the field. The graduates' competencies are also: *Learning Outcomes* (*IT*) or Learning Outcomes formulated based on Government Regulation No. 8 of 2012 concerning the Indonesian National Qualifications Framework (KKNI) at level 6 (bachelor).

The main fields of study and expertise of MP-PE are Physics learning models, development of Physics teaching materials, and Physics learning assessment. The profile of MP-PE graduates is experts in Physics education, Physics education research, and experts as Physics education staff. Employment opportunities for MP-PE graduates are educational institutions, both schools/madrasahs and universities, research institutions, as well as educational and training institutions.

The formulation of the profile is also oriented towards the vision and mission of MP-PE, and is based on the results of an agreement in the Physics Education Masters Forum initiated by the Professional Association, namely HFI (Indonesian Physics Association) which consists of representatives from the Physics Education Masters Study Program from various universities in Indonesia. namely UNJ, UNIMED, UNM, UM, UNY, UNES, UNESA, UPI, UNIMED, UNP, etc.

Currently there are 12 permanent lecturers with areas of expertise in accordance with the Master's program in Physics Education, all of whom have the qualities and qualifications in accordance with the field of science required for both lectures and research (all of them have PhD qualifications). All lecturers who serve as examiners or research supervisors have at least five years of experience guiding Master's research in their field. To ensure the suitability of the lecturer's field of knowledge with the student's research, before being submitted for SK, they are first asked to sign a statement of willingness to become the supervisor of the student concerned.

E. VISION AND MISSION

Vision

The vision of the SPs UPI Physics Education Master's Study Program is to become a center for education and study of physics education that is superior and has an international reputation. The explanation of the vision is described as follows:

1. The vision of the SPs UPI Physics Education master's program is a common goal of the entire academic community which is expected to be achieved by 2025. This is also in line with UPI's vision which is expected to be achieved by 2025.
2. What is meant by excellence is that the SPs UPI physics education master's program is directed and developed in such a way that the strategy or method of physics education and the study of physics education is superior compared to other higher education institutions, both nationally and internationally in the ASEAN region.

Mission

In an effort to realize the vision, the mission of the Physics Education Masters study program is formulated to:

1. Organizing physics education with the latest learning strategies and methods to produce graduates who are able to compete at national and international levels.
2. Carrying out research related to physics science and physics education to produce superior Indonesian human resources with a research culture.
3. Carry out community service activities in the field of physics education and others in accordance with research results, community needs, and developments in science and technology.
4. Establish and develop collaboration with various national and international institutions related to physics education learning and research.

F. PURPOSE

The Physics Education Master's Program is able to produce graduates who have the following characteristics and abilities:

1. Have broad insight and high concern for physics education in all its aspects,
2. Have in-depth knowledge and mastery of physics content as well as knowledge of physics learning pedagogy which includes approaches, methods, physics learning strategies that are their expertise,
3. Have knowledge of learning assessment, assessment of student characteristics and development, curriculum assessment by utilizing science and technology, and have knowledge of managing physics education.
4. Have the ability to analyze and apply various appropriate research methodologies to solve problems in physics learning.
5. Able to communicate and disseminate science and technology in the field of physics education both orally and in writing to gain recognition at national and international levels.

G. GRADUATE PROFILE

Profile	Profile Description
Prospective educator (teacher, lecturer, supervisor, widyaiswara)	Have in-depth knowledge and mastery of Physics content as well as knowledge of Physics pedagogy which includes Physics learning approaches, methods, strategies, as well as assessing, evaluating and developing Physics education.
Researcher	Able to develop knowledge and technology in the field of Physics education through inter- or multidisciplinary research approaches, to produce innovative and tested work.

H. LEARNING OUTCOMES

1. ATTITUDE	
S1	Fear God Almighty and be 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 and state, and the progress of civilization based on Pancasila.
S4	Acting as a citizen who is proud and loves the country, 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 original opinions or findings of others.
S6	Work together and have social sensitivity and concern for society and the environment.
S7	Obey the law and be disciplined in social and state life.
S8	Internalize academic values, norms and ethics.
S9	Demonstrate a responsible attitude towards work in their field of expertise independently.
S10	Internalize the spirit of independence, struggle and entrepreneurship.
S11	Behave and behave scientifically, educatively and religiously.
2. KNOWLEDGE	
P1	Mastering the concepts and theories of learning in physics education and their implications for learning.
P2	Mastering quantitative and/or qualitative physics education research methodology.
P3	Mastering various alternative solutions to physics education problems with an inter or multidisciplinary approach.

P4	Mastering Physics and *pedagogical physics-content* advanced level.
3. GENERAL SKILLS	
KU 1	Able to develop logical, critical, systematic and creative thinking in the application of technology that pays attention to and applies humanities values according to their field of expertise in order to produce prototypes, design works, art products or value-added technological innovations, compiling scientific conceptions or works based on rules, procedures , and scientific ethics in the form of a thesis or other equivalent form, and uploaded on the university website, as well as work presented or exhibited.
KU2	Able to carry out academic validation or studies according to their field of expertise in solving problems in society or relevant industry through developing their knowledge and expertise.
KU3	Able to compose ideas, thoughts and technical arguments responsibly and based on academic ethics, and communicate them through the media to the academic community and the wider community.
KU4	Able to identify the scientific field that is the object of research and position it into a problem solving scheme that is more comprehensive and interdisciplinary or multi-disciplinary in nature.
KU5	Able to make decisions in the context of solving technology application problems that pay attention to and apply humanities values based on experimental studies of information and data.
KU6	Able to manage, develop and improve the quality of cooperation both in his institution and other institutions, by prioritizing the quality of results and the timeliness of completing work.
KU7	Able to increase learning capacity independently.
KU8	Able to document, store, secure and recover prototype data, design work or art products in order to ensure validity and prevent plagiarism.
4. SPECIAL SKILLS	
KK1	Carrying out research and development in physics education with a quantitative and/or qualitative approach to produce innovative and tested work.

KK2	Identifying and solving physics education problems by using various inter- or multidisciplinary, adaptive and flexible approaches to ICT-based physics learning and learning.
KK3	Publish the results of physics education research at the national and/or international level.

I. LEARNING PROCESS

The learning system implemented in the Physics education master's program refers to the standard science education process which is oriented towards providing experience to understand science process skills and is developed through analytical, inductive and deductive thinking skills, to solve problems related to Physics problems and learning. The implementation of lectures in the Education Program also refers to research-based learning. The students raised real problems in physics education in field, then the problem is discussed in lectures to find alternative solutions.

Lectures are carried out through integrated theoretical and practical lectures. Apart from that, lectures are also carried out through expositories, demonstrations, assignments, discussions and information. Field lectures are carried out in certain courses in the subject group in the field of study. The learning system is built based on planning that is relevant to the objectives, learning domain and hierarchy. Learning is carried out using various challenging strategies and techniques, builds independence, encourages students to think critically, explore, be creative and experiment by utilizing various sources.

Learning implementation has a mechanism to monitor, review and periodically improve lecture activities (attendance of lecturers, students and suitability of material to the syllabus), preparation of lecture material and assessment of learning outcomes. Each lecture is accompanied by an official report which is signed at each meeting by both the student (level head) and the lecturer. In general, lectures in the Physics Education Master program are carried out with a high level of independence, so that the average assignment weight is more dominant than the written exam score. Apart from that, the assessments developed are based on course learning outcomes (*course learning outcomes*) which was developed in order to achieve study program learning outcomes (*learning outcomes*).

Lecture monitoring is carried out at each meeting by providing a lecture report sheet (BAP), which contains a) student attendance, b) lecturer attendance, c) lecture material. Lectures are held 12-14 times, Mid-Semester Examination (UTS) once and Final Semester Examination (UAS) once. If there are lectures that are not held in accordance with the

requirements for various reasons, such as lecture days coinciding with national holidays or other activities such as graduations, this can be anticipated by increasing the number of meetings outside the specified schedule.

Lecture monitoring is also carried out through the implementation of ISO 9001:2015, in the Physics education master's program, namely on quality targets regarding the level of conformity between the syllabus and actual lectures, and the number of lecture meetings. Monitoring lecturer performance in lectures is aimed at ensuring that lecturer performance in learning Each semester has been carried out well in accordance with its main tasks and functions. This evaluation is also aimed at identifying and eliminating obstacles so that lecturer performance becomes better. Lecturer performance assessments are carried out by students online through the lecturer performance evaluation information system at the end of the lecture, at the address: http//sino2.upi.edu/produk-pbm.

Every half semester, the study program always monitors the implementation of lectures (number of lectures, student attendance and compliance with the syllabus). Next, the study program reports it to the SPs leadership, through SKM SPs.

J. EVALUATION

The process of preparing research proposals and carrying out thesis research for the Physics education study program refers to the SOP with document code P-SPSUPI-AKD-07. This SOP explains the requirements for submitting a research proposal seminar, procedures for submitting research proposals to applicants. The thesis research proposal was designed during the International Studies Analysis lecture, referring to the research methods that students have mastered through the research methods course. Research ideas can come from students themselves or follow umbrella research developed by a team of lecturers. The design is then discussed with the PA lecturer. Then it is submitted to the study program for a seminar.

The thesis supervisor consists of two people who have expertise in the field of research, and are appointed through the SPs Director's Decree. Carrying out research because it concerns educational research, the place of implementation can be carried out at the school/educational institution where the student works, or at another relevant school/institution.

Monitoring and evaluation of thesis writing is carried out through student guidance books (including guidance during research). Quality assurance of the writing process is carried out in addition to intensive supervision with two supervisors, as well as through presentation of the thesis in front of two supervisors and two examiners whose expertise is relevant. POB monitoring and evaluation of thesis writing, adapted to POB for Bachelor of

Physics education.

A student's success in taking a course is expressed by a final grade following the following assessment criteria:

Value Category			Level Ability
Letter	Number	Quality Degree	
A	4	Special	92-100
A^-	3,7	Almost Special	86-91
B^+	3,4	Very well	81-85
B	3	Good	76-80
B^-	2,7	Pretty good	71-75

The final exam for master's studies is carried out through stage 1 and 2 thesis research exams, which are regulated in academic guidelines, carried out in the form of a thesis exam. After fulfilling the eligibility to take the thesis examination (approval of the examination from the supervisor, having passed the comprehensive/qualification examination and having completed all courses, the thesis examination is carried out in two stages. In both stages the student is tested by two examiners (apart from the two supervisors) who are appointed by the SPs director's decree. The second stage of the exam is carried out, after various suggestions/input from the examining lecturer are accommodated by the student, and approved by the supervisor and examiner 2.

K. CURRICULUM STRUCTURE

No	Code	Subject Group	ECTS	Semester			
				1	2	3	4
A. Postgraduate Expertise Courses (MKKPs)							
1.	PS701	Applied Statistics	4.5	X			
2.	PS702	Philosophy of Science	3	X			
3.	PS703	Pedagogical Studies	3		X		
Number of MKKPs credits			**10.5**	**7.5**	**3**		
B. Study Program Core Expertise Subjects (MKKIPS)							
1.	FI711	Waves and Fields	4.5	X			
2.	FI712	Taxonomy of Physics Education	3	X			
3.	FI713	Physics Learning Innovation	3	X			
4.	FI721	Physics Learning Media Innovation	3		X		
5.	FI722	Physics Education Research Design	3		X		
6.	FI723	Physics Learning Assessment	3		X		
7.	FI724	Physics Education Scientific Publication	3		X		
Number of MKKIPS credits			**22.5**	**10.5**	**12**		
C. Study Program Expertise Course (MKKPPS)*)							
1.	FI714	Analytical Mechanics	4.5	X			

No	Code	Subject Group	Sks	Semester			
				1	2	3	4
2.	FI715	Astronomy and Astrophysics	3	X			
3.	FI716	ICT in Physics Learning	3	X			
4.	FI717	Physics Education Technology and Engineering	3	X			
5.	FI725	Innovation in Physics Teaching Materials	3		X		
6.	FI726	Development of Physics Experiments	3		X		
7.	FI727	Physiography	3		X		
8.	FI728	Quality Assurance in Physics Education	3		X		
9.	FI729	Physics Education for Sustainable Development	3		X		
10.	FI731	Structure and Properties of Materials	3			X	
11.	FI732	Instrumentation Systems	3			X	
Number of MKKPPS credits (to be taken)			**13.5**	**4.5**	**6**	**3**	
Prerequesite Course for Ouside Field (MKAv)*							
1.	FI251	Physics Learning Strategy	3	X			
2	FI252	ICT Literacy and Physics Learning Media	3	X			
3	FI253	Evaluation of Physics Learning	3		X		
4	FI551	Physics Learning Planning	3		X		
Number of MKAv credits			**18**	**9**	**9**		
Thesis							
1	PK798	Thesis	12				X
Number of Thesis credits			**12**	**0**	**0**	**0**	**8**
The total study load for the Physics Master's Program that comes from the linear study program			**58.5**	**22.5**	**21**	**3**	**12**

The total study load for the Physics Master's Program that comes from the study program is not linear	**76.5**	**31.5**	**30**	**3**	**12**

MAPPING CPPS WITH CPMK

No	Code	Course Name	SKS	Attitude											Knowledge				General Skills								Skills Special		
				1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	1	2	3	4	5	6	7	8	1	2	3
A. Postgraduate Expertise Courses (MKKPs)																													
1	PS701	Science Data Statistics	3	T	S			S					R	R		T	T						T						
2	PS702	Philosophy of Science	4.5								S					S	S	T		T			T				R	S	T
3	PS703	Pedagogical Studies	3	T	S			S					R			T	T						T						
B. Study Program Core Expertise Subjects (MKKIPS)																													
1	FI711	Waves and Fields	4.5	R	R	R	R	T	R	R	R	R	R		R	R	R	T	S							R	S		R
2	FI712	Taxonomy of Physics Education	3		S	S	T	S		R			R		S	S	T	S	R	S	S	R	R	R	S	R	T	R	R
3	FI713	Physics Learning Innovation	3		T	S	T	S				R			T	S	T	S	T	S	S				T	R	S	R	R
4	FI721	Media Innovation Physics Learning	3		S		T	S				R			S		T	S		S	S	S	S	S	S	S	S	R	R
5	FI722	Research Design Pend. Physics	3		S	T	S	R				R	R		S	T	S		S	S	S	R	R				S	R	R
6	FI723	Physics Learning Assessment	3	R	S	S	T	S					R	R	S	S	T	S							R	S	R	S	S	S
7	FI724	Scientific Publications Physics Education	3	R	S	S		S	R				R		S	S	R	S	T	S	S						R	S	R	T
C. Study Program Expertise Course (MKKPPS)																													

1	FI714	Analytical Mechanics	4.5		R	R		T					R		S			T	S	R					R	R	S	R	R
2	FI715	Astronomy and Astrophysics	3	R	S	S	S	T	R				R	R	S	S	S	T	S	R					R	R	S	R	R
3	FI716	ICT in Physics learning	3		S	S	T	S	R		R				S	S	T	S			R	R	R				S	T	S
4	FI717	Technology and Engineering Pend. Physics	3		S	S	T		R	R					S	S	T		S	S	S						S	T	R
5	FI725	Teaching Material Innovation Physics	3		S	R	T	R							S	R	T		S	R					S	R	S	R	S
6	FI726	Development Physics Experiments	3		S	S	T	S	R				R		S	S	T	S	R	S	S	R	R	R	R	R	S	S	R
7	FI727	Physiography	3	R	S	S	S	T			R	R	R	R	S	S	S	T			S	R				R	S	R	R
8	FI728	Quality Assurance Pend. Physics	3	R	R	R	T	S				R		R	R	R	T	S							R	R	S	T	S
9	FI729	Pend. Physics for Pemb. Sustainable	3	R	T	T	T	T	R					R	T	T	T	T	S					R	R	R	S	T	S
10	FI731	Structure and Properties of Materials	3	R				T	R			R	R				R	T	R	R			R			R	S		S
11	FI732	Instrumentation Systems	3				R	T	R			R	R		R			T	S	R			R			R	S		S
D. Prerequesite Course for Ouside Field (MKAv)																													
1	FI251	ICT Literacy and Physics Learning	4.5	R	T				R		R		R		T	R	R		R	R	S	R				S	T	S

		Media																												
2	FI252	Physics Learning Strategy	4.5	R	T	R	R	R				R	R		T				R	R					R	R	R	T	S
3	FI551	Planning Physics Learning	4.5	R	T	R					R	R	R	R	T				R	R	R	R					S	T	S
4	FI253	Evaluation of Physics Learning	4.5	R	T	R	R						R	R	T	R	R	R	R	R					R	R	T	T	S
E. Thesis																														
1	FI799	Physics Education Thesis	12	S	T	T	T	T	R	R	R	R	R	R	T	T	T	T	T	T	T	R	R	R	R	R	T	T	T

Information:
Q: MK's contribution to CPPS is high.
S: MK's contribution to CPPS is moderate.
R: MK's contribution to CPPS is low.