



*Mencerdaskan dan
Memartabatkan Bangsa*

Curriculum Overview

Master Degree of Mathematics Education, Faculty of Mathematics and
Natural Science Universitas Negeri Jakarta

2022

A. OBJECTIVES OF THE DEGREE PROGRAMME

The Vision and Mission of the Institution

Vision of Universitas Negeri Jakarta

“To be a Reputable University in Asia”

Mission of Universitas Negeri Jakarta

Organizing the Tri Dharma of Higher Education that is Excellent and Useful for the Benefit of Humans

The Vision and Mission Objectives of Faculty

The vision of the Faculty of Mathematics and Natural Science

“To become a faculty that excels in Mathematics, Natural Sciences, Mathematics Education and Natural Sciences Education based on Faith and Piety.”

Mission of the Faculty of Mathematics and Natural Science

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

The Vision of Master of Mathematics Education Program

Vision of Master of Mathematics Education Program

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

B. PROGRAM EDUCATIONAL OBJECTIVES (PEO)

The PEO was developed based on vision and mission in developing graduates of Master of Mathematics Education program who possess high academic capabilities, social competence, innovation, creativity, competitiveness, and motivation for lifelong learning to become educators, professional researchers, who:

1. Have a mastery in mathematics education theory and take role as professional educators at various levels and related fields.
2. Capable of conducting research based on concepts, theories, and new innovation to solve a recent problem in Mathematics Education.

C. PROGRAM LEARNING OUTCOMES (PLO)

The program allows the students to acquire the required competencies that have been set before. Based on this reason, Program Learning Outcome (PLO) is designed in curriculum development, presented in Table 1 below. The PLOs are classified into two areas of social competence and specialist competence.

Table 1. Program Learning Outcomes of Master of Mathematics Education Study Program

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

	PLO 8	Develop and apply Information Technology and Communication (ICT) in the management of learning organizations.
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The connection can be seen in the figure below to see the relevance between PLO and PEO that has been set.

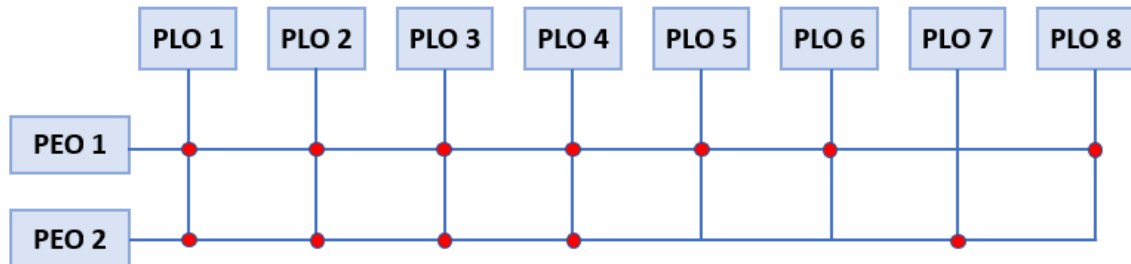


Figure 1. Matrix of PLO and PEO of Master of Mathematics Education Study Program

The Subject-Specific Criteria (SSC) are given from ASIN SSC 13 about social and specialist competencies. The SSC is presented in Table 2 below:

Table 2. Subject Specific Criteria (SSC) of Master of Mathematics Education Study Program

SSC (Subject-Specific Criteria)		
Social Competences	SSC 1	Upholding human values in duties based on religion, morals, and ethics.
	SSC 2	Demonstrates a hard-working attitude and does not give up easily in solving problems.
Specialist competences	SSC 3	Able to analyze and make formal proof of mathematical statements appropriately.
	SSC 4	Able to apply mathematical concepts to new situations
	SSC 5	Able to apply mathematical concepts to solve problems in real life.
	SSC 6	Able to analyze and apply pedagogic concepts and learning theories relevant to implementing mathematics learning practices.
	SSC 7	Analyzing and developing mathematics learning designs that are creative and innovative, flexible in following curriculum developments, and oriented towards the use of students' daily environment.
	SSC 8	Able to develop measurement and assessment instruments that are valid and reliable to be used as a basis for evaluation in learning mathematics.
	SSC 9	Able to apply and integrate pedagogical theory, mathematical concepts, and technology in developing ICT-based learning media.

	SSC 10	Have adequate English skills for lifelong learning and compete globally.
	SSC 11	Have the ability to analyze current problems related to mathematics education, find appropriate solutions by conducting research, writing research reports in the form of theses, presenting them in various scientific forums, and publishing them in reputable scientific journals.

The relevance of PLO and SSC of the Master of Mathematics Education Study Program is presented in the matrix below.

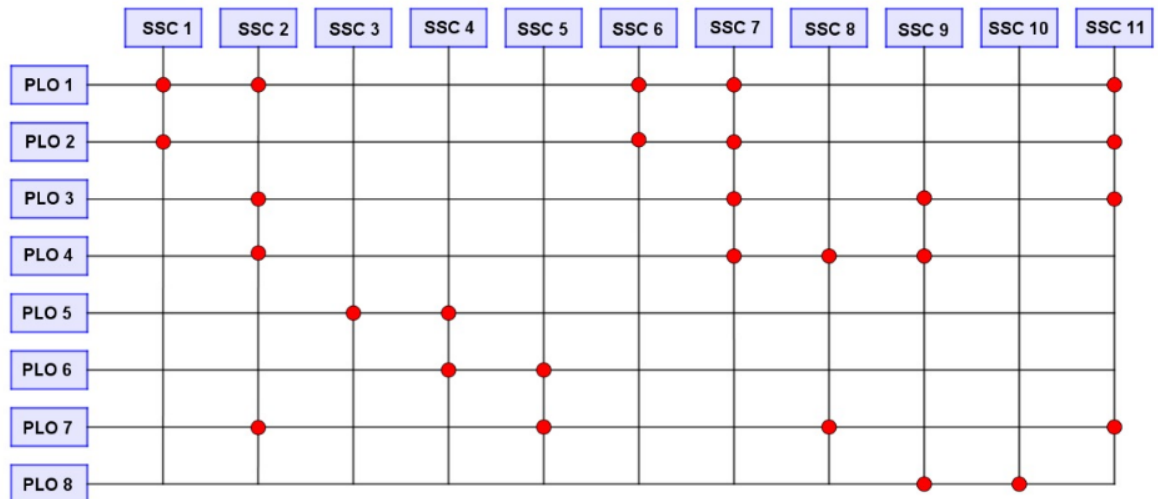


Figure 2. Matrix of PLO and SSC of Master of Mathematics Education Study Program

D. PROGRAM STRUCTURE

The curriculum was designed to reflect the visions, missions, and goals of the Master Degree of Mathematics Education Study Program, Faculty of Mathematics and Natural Sciences (FMIPA) UNJ, in terms of generating a graduate as a teacher/an educator in Mathematics who also can manage a laboratory as well as entrepreneurship according to recent time and stakeholders. The curriculum structure was arranged in line with Program Learning Outcome (PLO) description, which can be found specifically in Table 1. The curriculum mapping figure has explained the relationship between each course name and course subject of study from the Master of Mathematics Education study program which can be seen in Figure 3.

The curriculum of Mathematics education was arranged to provide the graduate's need of knowledge and skills in teaching and learning education as well as Mathematics science. Therefore, the curriculum generally has four main course subjects, such as the first-course subject is to support education, the second-course subject is to support the concept of mathematics, and the third-course subject is to support research. The specific explanation

of the relationship between course subjects and course names in the curriculum can be seen in Table 4.

The students of the Mathematics Education Program complete their studies in 2 years (4 semesters) length of study as the fastest period, and four years (8 semesters) length of study as the most extended period. The courses that they have to complete during the study program are 43 credits or equal to 216 ECTS. The courses groups include university courses with 8 credits (20,80 ECTS) that are compulsory for all students from the university; compulsory courses with 31 credits (80,6 ECTS) as compulsory courses for students who are in the Education program; and elective courses with 4 credits (10,4 ECTS) both in applied Mathematics and professional education courses.

Table 3. Types of Courses and Course Weight in Curriculum of Master of Mathematics Education Study Program

No	Courses Groups	Total (In Credits)	Total (In ECTS)
1	University's Courses	8	20,8
2	Compulsory Courses	31	80.6
3	Elective Course	4	10.4
	Total	43	111.8

Table 4. Body of Knowledge (BK) of Master of Mathematics of Education Study Program

Code	Course category	Descriptions	Course Name (BK)
SM1	Education	This study material requires students to master and analyze various views related to pedagogical concepts and learning theories, solve mathematics learning problems by formulating innovative learning designs integrated with ICT by considering the needs of students and the world of work, and develop valid and reliable instruments to evaluate learning.	<ol style="list-style-type: none"> 1. Mathematics Teaching and Learning Designs 2. Development and Problems in Mathematics Education 3. New Orientation in Education 4. Media and Information and Communication Technology (ICT) in Mathematics Teaching and Learning 5. Mathematical Higher Order Thinking 6. English for Mathematics Teaching and Learning 7. Realistic Mathematics Teaching and Learning 8. The Philosophy of Science

SM2	Mathematics	Understand, analyze, and prove concepts, axioms, definitions, procedures and theorems in mathematics and statistics. Includes, among others, sets, functions, discrete and continuous, groups, rings, and fields. Create a mathematical model related to natural events around you.	<ol style="list-style-type: none"> 1. Real Analysis 2. Advanced Real Analysis 3. Abstract Algebra 4. Advanced Abstract Algebra 5. Mathematical Statistics 6. Discrete Mathematics 7. Mathematical Modeling
SM3	Research	Research subject matter focuses on the philosophical background of research, various research methodologies that suitable for conducting educational research.	<ol style="list-style-type: none"> 1. Educational Statistics 2. Evaluation in Mathematics Teaching and Learning 3. Educational Research Methodology 4. Development of research Instrument 5. Thesis Seminar 6. Thesis

Table 5 Matrix between CLO and PLO of Mathematics Education Study Program

Course code	Course Name	CP	ECTS	PLO							
				1	2	3	4	5	6	7	8
Semester 1											
30061052	The Philosophy of Science	2	5,2	v							
30061033	Educational Research Methodology	3	7,8	v			v		v	v	
31360022	Abstract Algebra	2	5,2					v			
31360012	Real Analysis	2	5,2					v			
31362093	Mathematical Statistics	3	7,8				v	v			
31361012	New Orientation in Education	2	5,2	v	v						
Total CP		15	39								
Semester 2											
30062013	Educational Statistics	3	7,8				v		v	v	

31362032	Mathematics Teaching and Learning Designs	3	7,8		v	v					
31362052	Evaluation in Mathematics Teaching and Learning	2	5,2				v				
31363082	Advanced Real Analysis	2	5,2					v			
31363092	Advanced Abstract Algebra	2	5,2					v			
31362013	Development and Problems in Mathematics Education	3	7,8		v						
Total CP		14	36,4								
Semester 3											
31362062	Mathematical Modeling *	2	5,2						v		
31363022	Discrete Mathematics *	2	5,2						v		
31363032	Media and Information and Communication Technology (ICT) in Mathematics Teaching and Learning	2	5,2			v					v
31362022	Realistic Mathematics Teaching and Learning *)	2	5,2		v	v					
31363012	Mathematical Higher Order Thinking *	2	5,2		v						
31362042	English for Mathematics Teaching and Learning*)	2	5,2								v
00000012	Leadership in Learning Organizations *)	3	7,8								v
31363052	Thesis Seminar	2	5,2	v	v	v				v	

31360032	Development of research Instrument *)	2	5,2								v	
Total CP		12	20,8									
Semester 4												
30060016	Thesis	6	15,6	v	v	v					v	
Total CP		8	20,8									

E. Structure and Module of Master of Mathematics Education Study Program

The structure and course (module) in of Master of Mathematics Education study program consists of 43 credit hours. The compulsory courses of 31 credit hours give general education and basic competency for a mathematics master's degree. The university's courses that are offered to the students consist of 8 credits hour. The elective courses that are offered to the students consist of 4 credits hours. Elective courses are categorized into two interest groups which are mathematics and mathematics education. In Master of Mathematics Education study program, the curriculum structure has been divided into four semesters program intentions.

First semester of study focuses on basic knowledge of mathematics (real analysis and abstract algebra); philosophy of science; education (new orientation in education); and mathematics research (educational research methodology and mathematical statistics) which consist of 15 credits courses (39 ECTS). Second semester of study focuses on education context (development and problems in mathematics education; and teaching and learning, educational statistics); and advanced mathematics (advanced real analysis and advanced algebra) which consists of 14 credits courses (36,4). Third semester of study focuses on teaching and learning mathematics in education; thesis seminar; education context (media, development of research instrument); mathematics concept (mathematical modeling and discrete mathematics) for a total 12 credits course (20,8). The last semester of study consists of 6 credits (15,6) to be passed by students which focus on thesis and elective courses that support the thesis. Each course contributes to PLO in Master of Mathematics Education. Each course contributes to PLO in the Master of Mathematics Education study program as Figure 3.

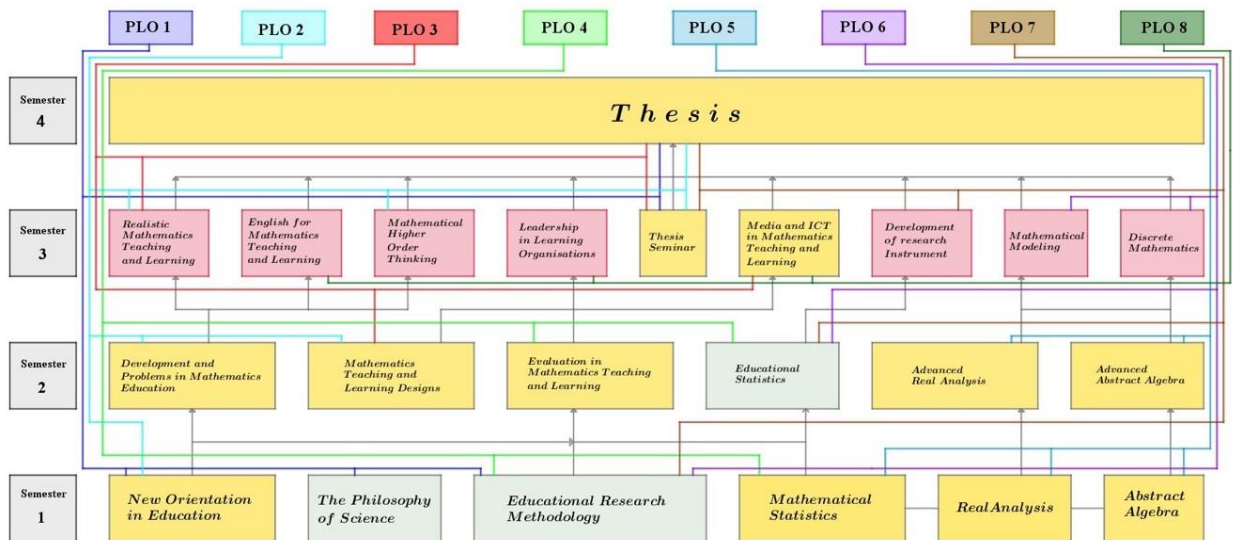


Figure 3. Course mapping based of Courses and PLO in the Master of Mathematics Education Study Program