Curriculum Overview

Bachelor of Mathematics Education Study Programme

Faculty of Mathematics and Natural Science
Universitas Negeri Jakarta

2023

A. Objectives of The Degree Programme

The Vision and Mission of Institution

Vision of Universitas Negeri Jakarta

- Becoming a Reputable University in the Asian Region

Mission of Universitas Negeri Jakarta

- Organizing the Tridharma of Higher Education that is Excellent and Useful for the Benefit of Humans

The Vision and Mission Objectives of Faculty

Vision of Faculty of Mathematics and Natural Science

- To become an excellent and competitive faculty in the field of Mathematics, Natural Sciences, Mathematics Education, and Natural Sciences Education at the ASIAN level based on faith and piety.

Mission of Faculty of Mathematics and Natural Science

- To produce graduates in the field of Mathematics and Natural Sciences education who are professional, able to utilize information and communication technology, have faith and piety, have entrepreneurial skills, according to stakeholder needs, and are able to compete at the ASEAN level.
- To produce quality scientific works based on research results in the field of Mathematics and Natural Sciences and Mathematics and Natural Sciences education in accordance with the development of science and technology.
- To produce works of community service in the field of Mathematics and Natural Sciences and Mathematics and Natural Sciences education that can be directly utilized by the community.
- To establish mutually beneficial cooperation with partner institutions both from within and from abroad, especially those related to the development of Mathematics, Natural Sciences, Mathematics Education, and Natural Sciences Education faculty.

The Vision of Bachelor of Mathematics Education Study Programme

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

B. Program Educational Objectives (PEO)

The Qualification Profile (QP) of bachelor's degree in Mathematics Education Study Program and its specifications is presented in the table below.

No	Qualification Profile	Specifications
1	Professional Educators	Competent in designing, implementing, and evaluating learning.
2	Research Assistant	Qualified to conduct research using appropriate research methodology to provide alternative solutions to educational problems in Mathematics.

The PEO was developed based on vision and mission in developing graduates who are qualified as mathematics educators and researche assistant. The programme provides opportunities for graduates to be able to:

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

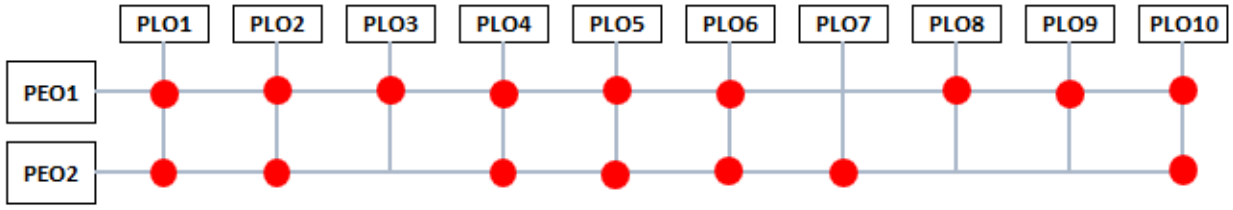
C. Program Learning Outcomes (PLO)

Mathematics Education Study Program offer the students the possibility to acquire the required competences that have been set before. Based on this reason, Program Learning Outcome (PLO) was designed in curriculum development. The procedure of formating the learning outcomes have been in accordance with the standard (from guidelines of guidelines of curriculum development, such as Higher Education and Profession Association, KKNI, Accreditation Berau, and Association Profession of Study Program) and verified by academic board of faculty. The procedure involves both internal and external stakeholders, including academic staff, university and faculty supporter, alumni, students, and experts. The PLOs are classified into two areas, namely sosial competences and specialist competences.

Area	Code	Programme Learning Outcome
Social Competences	PLO 1	Uphold human values accordance with religion, morals, and ethics.
	PLO 2	Internalizing the spirit of independence, perseverance, and entrepreneurship.
	PLO 3	Able to understand themselves as an educator.

Area	Code	Programme Learning Outcome
	PLO 4	Able to work in a team, social awareness, and concern for community and environment.
Specialist Competences	PLO 5	Mastering the theoretical concept of mathematics, including mathematical logic, discrete mathematics, algebra, analysis and geometry, probability, and statistics.
	PLO 6	Mastering in modeling mathematical concepts, linear programs, differential equations, dan numerical methods.
	PLO 7	Able to conduct, analyze, and apply research outcomes to improve the mathematics learning process.
	PLO 8	Able to plan, implement, and evaluate learning in learning mathematics.
	PLO 9	Able to employ various learning resources and mathematics learning media.
	PLO 10	Able to solve problems in real situations based on knowledge of mathematics education.

The relevance between PLO and PEO of the bachelor of Mathematics Education Study Program is described below.



Subject-Spesific Criteria (SSC)

The Subject-Specific Criteria are given from ASIIN developed based on the Mathematics Education Study Program's body of knowledge and its PLO classification. The Subject-Specific Criteria (SSC) for the Mathematics Education Study Programme graduates are stated in the following table.

SSC (Subject-Specific Criteria)		
Specialist Competences	**SSC 1**	Masters the basics of mathematical theoretical concepts including mathematical logic, discrete mathematics, algebra, analysis and geometry, probability, and statistics.
	SSC 2	Masters the principles of mathematical modeling, linear

SSC (Subject-Specific Criteria)		
		programming, differential equations, and numerical methods.
	SSC 3	They are able to conduct and analyze research data with appropriate software and interpret the results for the scientific development of mathematics education
	SSC 4	They are able to apply research results to improve the process of learning mathematics continually.
	SSC 5	They are able to apply research results to improve the process of learning mathematics continually.
	SSC 6	They are able to select and apply learning approaches and models, teaching materials, and assessments to support innovative mathematics learning.
	SSC 7	They are able to review the educational theory and development models of mathematics learning and apply them to design mathematics learning adapted to the current learning paradigm.
	SSC 8	They are able to apply information and communication technology (ICT) in planning, implementing, and evaluating learning mathematics
	SSC 9	They are able to formulate/design, produce and use teaching aids in mathematics.
	SSC 10	They are able to analyze real situations to find problems in mathematics education.
	SSC 11	They are able to design alternative problem-solving based on scientific studies in mathematics education.
	SSC 12	They are able to apply logical, critical, systematic, and innovative thinking in the context of the development or implementation of science and technology that aware and uses humanities values following the field of mathematics education.
Social Competences	**SSC 13**	They are able to work as a mathematics educator following the educator's code of ethics.
	SSC 14	They are able to work independently or in teams in a di-verse culture, gender, social, and economic.
	SSC 15	They are able to take responsibility and develop them-selves as a mathematics educator, adapt to technological growth

SSC (Subject-Specific Criteria)		
		and educational paradigms to achieve the goals of the educator professional organization.
	SSC 16	They are able to maintain and expand professional net-works with supervisors, colleagues, and peers inside and outside the organization

The relevance between PLO and SSC of the bachelor of Mathematics Education Study Program is presented in the following matrix.

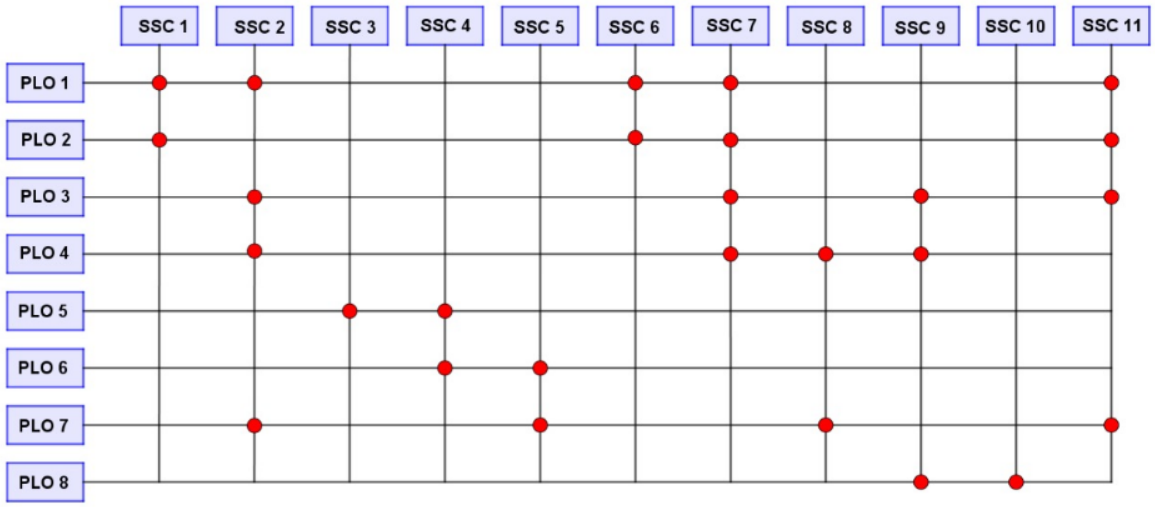


Figure 1. Matrix of Relationship between Programme Learning Outcomes (PLO) and Subject-Specific Criteria (SSC) of Master of Mathematics Education Study Programme

D. Programme Structure

The curriculum structure in bachelor degree program refers to higher education regulation (Permenristekdikti Number 44 of 2015 and Permendikbud Number 3 of 2020). In addition to follow the Indonesian National Qualifications Framework (KKNI), the National Higher Education Standards (SNPT), the standards of profession, in Mathematics Education is from the Indonesian Mathematics Educators' Society (I-MES) by considering the orientation future challenges and international accreditation. The name of the degree program is based on the Decree of the Minister of Research, Technology and Higher Education of the Republic of Indonesia Number 57/M/KPT/2019 concerning Names of Study Program in Higher Education in Indonesian and in English. The title to be attached to the bachelor's degree of Mathematics Education is Bachelor of Education (B.Ed) or Sarjana Pendidikan (S.Pd) in Indonesian language.

The courses that must be completed during a minimum study period of 8 (eight) semesters and a maximum of 14 (fourteen) semesters with 145 credit hours or 217.5 ECTS. In the final year, students conduct research as final thesis. The curriculum structure of bachelor of Mathematics Education study program consists of 4 (four) groups of courses:

1. University Courses which are general courses for all students in Universitas Negeri Jakarta.
2. Faculty Courses feature specific courses for Faculty of Mathematics and Natural Science.
3. Study Program Courses feature consist of Compulsory Courses and Elective Courses.
4. Pedagogy Courses

Table 1. Groups of Subjects and Workload of Curriculum of Bachelor of Mathematics Education Study Programme

No	Types of Courses	Total (In Credits)	Total (In ECTS)
1	University's Courses	14	21
2	Faculty's course	3	4.5
3	Pedagogy's courses	7	10.5
4	Study Programme's Compulsory Courses	97	145.5
5	Elective Course	4	6
6	Independent Learning Activities Course (MBKM)	20	30
Total		**145**	**217.5**

Mathematics Education is an integration of mathematics philosophy and education that unites the characteristics of mathematics and education to produce a body of knowledge from mathematics education. Therefore, the curricula consist of multidicipline, interdiciplinary, and transdiciplinary approach of mathematics and education and its relevance body knowledge. There are three cores of the subject matters (SM) in the bachelor of Mathematics Education study program in curriculum as presented in the following table.

Table 2. Subject Matter (SM) of Mathematics Education Programme

Code	Subject Matter	Descriptions	Course
SM1	General Basic Knowledge	Studies that develop competencies as individuals, professionals, and citizens and globally. A study that facilitates students to have the skills to think, collaborate,	1. Pancasila 2. Indonesian Language 3. English 4. Olympism 5. Religion 6. Civic Education

Code	Subject Matter	Descriptions	Course
		communicate, practice, and act scientifically to adapt to changes, especially in mathematics education.	7. The Philosophy of Mathematics and Natural Sciences 8. Big Data and Programming 9. Logic and Reasoning 10. Educational Research Methods 11. Entrepreneurship
SM2	Pedagogic and Didactic	Studies that describe the theory or basic principles of learning, understanding the characteristics of students, planning, implementing, and evaluating learning that can optimize the various potentials of students.	1. Foundation of Education 2. Educational Science 3. Student Development 4. Microteaching 5. Practice Teaching Skills 6. Learning Theory 7. Workshop 8. Introduction to Computer Animation 9. Planning, Management and Evaluation of Teaching 10. Designing Learning Kit 11. Designing Learning Media 12. Designing Teaching and Learning Instruments
SM3	Mathematics and Its Application	Studies on the basic concepts of mathematics, school mathematics, applied mathematics, and statistics.	1. Introduction of Basic Mathematics 2. English for Mathematics I 3. English for Mathematics II 4. Differential Calculus 5. Integral Calculus 6. Multivariable Calculus 7. Linear Algebra 8. Abstract Algebra 9. Elementary Differential Equation 10. Advanced Differential Equation 11. Complex Variable Functions 12. Real Analysis I 13. Real Analysis II 14. Learning on Mathematics for Elementary School 15. Learning on Mathematics for Junior High School 16. Learning on Mathematics for

Code	Subject Matter	Descriptions	Course
			Senior High School 17. Capita Selecta of Mathematics 18. History of Mathematics 19. Seminar on Mathematics 20. Pre-Thesis Seminar 21. Thesis 22. Euclid Geometry 23. Space Geometry 24. Analytical Geometry 25. Transformation Geometry 26. Descriptive Geometry 27. ICT Based Teaching and Learning in Mathematics 28. Programming Algorithm 29. Numerical Methods 30. Discrete Mathematics 31. Linear Programming 32. Mathematical Modeling 33. Theory of Numbers 34. History of Mathematics 35. Basic Statistics 36. Mathematical Statistics I 37. Mathematical Statistics II 38. Nonparametric Statistics 39. Operational Research 40. Experimental Design 41. Regression Analysis 42. Multivariate Analysis

The curriculum structure is based on course classification to achieve Program Learning Outcomes (PLO) of each study program. The structure and description of the courses can be seen in the module. Each course has a CLO which is used to measure PLO achievement.

Table 3. Curriculum structure mapping towards PLO of Mathematics Education Study Programme

Course Code	Course Name	CP	ECTS	PLO									
				1	2	3	4	5	6	7	8	9	10
Semester 1													
0005-111-2	Pancasila	2	3	√	√	√	√						
3005-006-2	Indonesian Language	2	3	√	√	√	√						
0005-307-4	Educational Foundation	3	4.5	√		√							
3005-112-1	Olympism	1	1.5	√	√		√						
3115-204-3	Differential Calculus	3	4.5					√	√				

Course Code	Course Name	CP	ECTS	PLO									
				1	2	3	4	5	6	7	8	9	10
3115-036-2	Introduction of Basic Mathematics	2	3					√	√				
3115-038-3	Basic Statistics	3	4.5					√	√	√			
3115-071-3	Linear Algebra	3	4.5					√	√				
	Total CP	**19**	**28.5**										
Semester 2													
0005-312-3	Religion	2	3	√		√							
0005-321-2	Educational Science	2	3	√		√							
0005-111-3	Civic Education	2	3	√	√	√	√						
0005-210-2	Student Development	2	3	√		√							
3115-205-3	Integral Calculus	3	4.5					√	√				
3005-002-2	Philosophy of Mathematics and Natural Sciences	2	3	√		√	√						
3115-044-3	Mathematical Statistics I	3	4.5					√	√				
3115-067-2	English for Mathematics I	2	3					√	√				
3115-211-3	Programming Algorithm	3	4.5					√	√				
	Total CP	**21**	**31.5**										
Semester 3													
0005-322-2	Introduction to Programming and Big Data	2	3					√	√				√
0005-214-4	Learning Theory	2	3	√		√							
3115-030-2	Theory of Numbers	2	3					√	√				
3115-073-2	Euclid Geometry	2	3					√					
3115-211-3	Complex Variable Functions	3	4.5					√					
3115-206-3	Multivariable Calculus	3	4.5					√	√				
3115-082-2	English for Mathematics II	2	3					√	√				
3115-212-3	Introduction to Computer Animation	3	4.5					√				√	
3115-063-2	Learning on Mathematics for Elementary School	2	3			√					√	√	√
	Total CP	**21**	**31.5**										
Semester 4													
0005-320-2	Logic and Scientific Reasoning	2	3					√		√	√		
3115-207-3	Elementary Differential Equation	3	4.5						√				
3115-051-3	Numerical Methods	3	4.5					√		√			
3115-011-2	Space Geometry	2	3					√					
3115-209-3	Analytical Geometry	3	4.5					√					
3115-048-3	Real Analysis I	3	4.5					√					
3115-045-3	Mathematical Statistics II	3	4.5					√	√				

Course Code	Course Name	CP	ECTS	PLO									
				1	2	3	4	5	6	7	8	9	10
3115-064-2	Learning on Mathematics for Junior High School	2	3			√					√	√	√
	Total CP	**21**	**31.5**										
Semester 5													
3115-208-3	Advanced Differential Equation	3	4.5						√				
3115-043-3	Transformation Geometry	3	4.5					√					
3115-049-3	Real Analysis II	3	4.5					√					
3115-053-3	Discrete Mathematics	3	4.5					√					
3115-010-2	Mathematics Workshop	2	3		√	√				√		√	√
3115-075-2	Learning on Mathematics for Senior High School	2	3			√					√	√	√
3005-202-3	Planning, Management and Evaluation of Teaching	3	4.5			√					√	√	√
	Elective Course(s)	2	7.5										
	Total CP	**21**	**31.5**										
Semester 6													
3115-031-3	Abstract Algebra	3	4.5					√					
3115-035-3	Linear Programming	3	4.5							√			
3115-214-3	ICT Based Teaching and Learning in Mathematics	3	4.5			√					√	√	√
3115-222-2	Educational Research Methods	2	3			√				√			
3115-210-3	Capita Selecta of Mathematics	3	4.5			√		√	√				
3115-237-2	Microteaching	2	3			√					√	√	
	Elective Course(s)	2	7.5										
	Total CP	**18**	**27**										
Semester 7													
3005-207-2	Pre-Thesis Seminar	2	3	√						√			√
KM-00016	Practice Teaching Skills	6	9	√	√	√	√			√	√	√	√
	Elective Courses (MBKM)	12	18										
	Total CP	**20**	**30**										
Semester 8													
3005-402-4	Thesis	4	6	√	√	√	√			√	√	√	√
	Total CP	**4**	**6**										
Elective Courses (MBKM)													
KM-00934	Designing Learning Kit	4	6		√	√				√		√	√
KM-00944	Designing Learning Media	4	6		√	√				√		√	√
KM-00954	Designing Teaching and Learning Instruments	4	6		√	√				√		√	√
Elective Courses													

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

Students of bachelor of Matehamtics Education study program have opportunity to take obligatory andelective courses, besides Independent Learning Activities (Merdeka Belajar Kampus Merdeka).

E. Structure and Module

The structure and course (module) in the Bachelor of Mathematics Education study programme consists of 145 credit hours (SKS). The study programme course consists of 97 credit hours (SKS) of compulsory courses focusing general and basic competences for a bachelor of mathematics education and 7 credit hours (SKS) for general pedagogy courses. Students are offered 4 credit hours (SKS) of ellective courses and 20 credit hours (SKS) of MBKM, and 14 credit hours (SKS) of general courses. Elective courses are categorized into three interest groups: Statistics, Geometry, and Applied Mathematics. The curriculum structure in the bachelor of Mathematics Education study programme has been divided into four years programme intentions. The first-year study focuses on basic knowledge of mathematics and natural science, general course, and basic philosophy of education, consisting of 40 credits hours (SKS) courses. The second year of study focuses on pedagogy courses, mathematics, and 42 credits hours (SKS). The Third-year of study focuses on mathematics and pedagogy of mathematics for 39 credits hours (SKS). The last year of the study consisted of 24 credits hours (SKS) to be passed by students, which focus on the MBKM programme, thesis and elective courses that support the thesis. The structure in the mathematics education study programme is based on the regulation at the national and university level, which combines mathematics content knowledge and pedagogy.

Furthermore, each course is designed to support students to achieve the PLOs. The following table presents the PLOs supported by each course in the curriculum.

Table 4. Curriculum structure mapping towards PLO of Mathematics Education Study Programme

Course Code	Course Name	CP	ECTS	PLO									
				1	2	3	4	5	6	7	8	9	10
Semester 1													
0005-111-2	Pancasila	2	3	√	√	√	√						
3005-006-2	Indonesian Language	2	3	√	√	√	√						
0005-307-4	Educational Foundation	3	4.5	√		√							
3005-112-1	Olympism	1	1.5	√	√		√						
3115-204-3	Differential Calculus	3	4.5					√	√				
3115-036-2	Introduction of Basic Mathematics	2	3					√	√				
3115-038-3	Basic Statistics	3	4.5					√	√	√			
3115-071-3	Linear Algebra	3	4.5					√	√				
	Total CP	**19**	**28.5**										
Semester 2													
0005-312-3	Religion	2	3	√		√							
0005-321-2	Educational Science	2	3	√		√							
0005-111-3	Civic Education	2	3	√	√	√	√						
0005-210-2	Student Development	2	3	√		√							
3115-205-3	Integral Calculus	3	4.5					√	√				
3005-002-2	Philosophy of Mathematics and Natural Sciences	2	3	√		√	√						
3115-044-3	Mathematical Statistics I	3	4.5					√	√				
3115-067-2	English for Mathematics I	2	3					√	√				
3115-211-3	Programming Algorithm	3	4.5					√	√				
	Total CP	**21**	**31.5**										
Semester 3													
0005-322-2	Introduction to Programming and Big Data	2	3					√	√				√
0005-214-4	Learning Theory	2	3	√		√							
3115-030-2	Theory of Numbers	2	3					√	√				
3115-073-2	Euclid Geometry	2	3					√					
3115-211-3	Complex Variable Functions	3	4.5					√					
3115-206-3	Multivariable Calculus	3	4.5					√	√				
3115-082-2	English for Mathematics II	2	3					√	√				
3115-212-3	Introduction to Computer Animation	3	4.5					√				√	
3115-063-2	Learning on Mathematics for Elementary School	2	3			√					√	√	√
	Total CP	**21**	**31.5**										
Semester 4													
0005-320-2	Logic and Scientific Reasoning	2	3					√		√	√		

Course Code	Course Name	CP	ECTS	PLO									
				1	2	3	4	5	6	7	8	9	10
3115-207-3	Elementary Differential Equation	3	4.5						√				
3115-051-3	Numerical Methods	3	4.5					√		√			
3115-011-2	Space Geometry	2	3					√					
3115-209-3	Analytical Geometry	3	4.5					√					
3115-048-3	Real Analysis I	3	4.5					√					
3115-045-3	Mathematical Statistics II	3	4.5					√	√				
3115-064-2	Learning on Mathematics for Junior High School	2	3			√					√	√	√
	Total CP	**21**	**31.5**										
Semester 5													
3115-208-3	Advanced Differential Equation	3	4.5						√				
3115-043-3	Transformation Geometry	3	4.5					√					
3115-049-3	Real Analysis II	3	4.5					√					
3115-053-3	Discrete Mathematics	3	4.5					√					
3115-010-2	Mathematics Workshop	2	3		√	√				√		√	√
3115-075-2	Learning on Mathematics for Senior High School	2	3			√					√	√	√
3005-202-3	Planning, Management and Evaluation of Teaching	3	4.5			√					√	√	√
	Elective Course	2	7.5										
	Total CP	**21**	**31.5**										
Semester 6													
3115-031-3	Abstract Algebra	3	4.5					√					
3115-035-3	Linear Programming	3	4.5							√			
3115-214-3	ICT Based Teaching and Learning in Mathematics	3	4.5			√					√	√	√
3115-222-2	Educational Research Methods	2	3			√				√			
3115-210-3	Capita Selecta of Mathematics	3	4.5			√		√	√				
3115-237-2	Microteaching	2	3			√					√	√	
	Elective Course	2	7.5										
	Total CP	**18**	**27**										
Semester 7													
3005-207-2	Pre-Thesis Seminar	2	3	√						√			√
KM-00016	Practice Teaching Skills	6	9	√	√	√	√			√	√	√	√
	Elective Courses (MBKM)	12	18										
	Total CP	**20**	**30**										
Semester 8													
3005-402-4	Thesis	4	6	√	√	√	√			√	√	√	√
	Total CP	**4**	**6**										
Elective Courses (MBKM)													

Course Code	Course Name	CP	ECTS	PLO									
				1	2	3	4	5	6	7	8	9	10
KM-00934	Designing Learning Kit	4	6		√	√				√		√	√
KM-00944	Designing Learning Media	4	6		√	√				√		√	√
KM-00954	Designing Teaching and Learning Instruments	4	6		√	√				√		√	√
Elective Courses													
3115-025-2	Descriptive Geometry	2	3					√					
3115-233-3	Nonparametric Statistics	2	3					√	√	√			√
3115-223-3	Operational Research	3	4.5							√			
3115-232-3	Experimental Design	3	4.5					√	√	√			√
3115-213-3	Regression Analysis	3	4.5					√	√	√			√
3115-215-3	Multivariate Analysis	3	4.5					√	√	√			√
3115-946-3	Mathematical Modelling	3	4.5						√				
3005-004-2	English	2	3	√	√	√	√						
3115-017-2	History of Mathematics	2	3	√			√	√	√				
3115-216-3	Entrepreneurship	3	4.5	√	√		√						√
3115-054-2	Seminar on Mathematics	2	3	√			√			√			
0005-300-2	Community Service Programme	2	3	√	√		√						√

Course mapping based on courses and PLO in Bachelor of Mathematics Education Study Programme is described in the following figure.

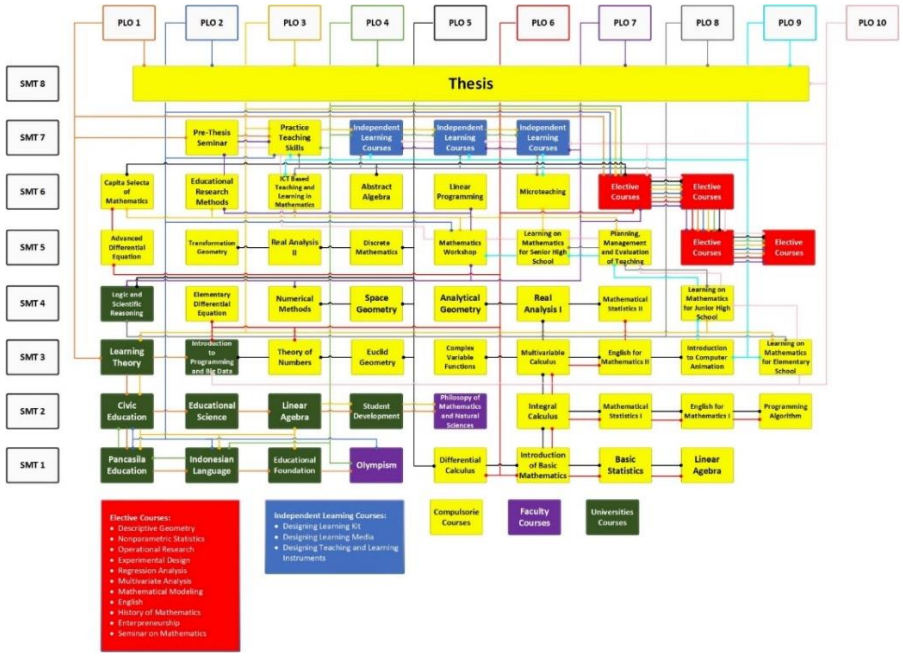


Figure 2. Course mapping based on Courses and PLO in Bachelor of Mathematics Education Study Programme