



CURRICULUM OVERVIEW

Bachelor of Mathematics Study Program

**Faculty of Mathematics and Natural Science
Universitas Negeri Jakarta**

A. OBJECTIVES OF THE DEGREE PROGRAM

A.1 THE VISION AND MISSION OF UNIVERSITY

VISION

To be a Reputable University in the Asia.

MISSION

Organizing the Tridharma of Higher Education that is Excellent and useful for the Benefit of Humans.

A.2 THE VISION AND MISSION OF FACULTY

VISION

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

MISSION

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

A.3 THE VISION AND MISSION OF BACHELOR OF MATHEMATICS STUDY PROGRAM

VISION

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

MISSION

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

B. QUALIFICATION PROFILE (QP)

The Qualification Profile of Bachelor of Mathematics Study Program and its specifications are shown in the Table 1 below.

Table 1 Qualification Profile of Bachelor of Mathematics Study Program

No	Qualification Profile	Specifications
1	Professional Educators	<ol style="list-style-type: none">a) Capable to conduct sustainable self-professional development in the area of mathematics and its applications.b) Proficient to convey their knowledge and expertise to associations to educate and dignity the nation.
2	Research Assistant	<ol style="list-style-type: none">a) Capable to assist in designing and conducting researchb) Capable to assist in analysing, managing, and updating data bases.c) Capable to assist in conducting literature review or field research.d) Capable to assist in writing systematic, structured, and massive research report.e) Publish the research in scientific journals and other dissemination methods.
3	Expert in Finance /Banking/Actuary	<ol style="list-style-type: none">a) Capable of modeling and analysing financial data.b) Capable of estimating probabilities and costs of incidents.c) Competent in designing, testing, and managing policies to minimise risks and maximise profits.d) Capable of designing insurance products

No	Qualification Profile	Specifications
		and to determine the premiums and benefits of the product.
4	Data Analyst	a) Have excellent skills in analysing, predicting business movements, and interpreting data. b) Have mastery in statistical and mathematical concepts, are able to visualise data, and operate machine learning.

C. PROGRAM EDUCATIONAL OBJECTIVES (PEO)

The PEO of the Bachelor of Mathematics Study Programme are to nurture graduates who are qualified as scientists, academics, industry experts, and entrepreneurs at the beginning of their careers. The Bachelor of Mathematics study programme provides the opportunity for graduates to be able to:

1. Possess a strong character in behaving within their environment, religious, patriotism, have a high empathy and awareness of the society and environment.
2. Professional, being able to create job opportunities and compete in the national and Asian job market in various fields related to mathematics and its applications.
3. Competent in making strategic decisions based on information and data analysis and providing solutions based on mathematical studies.
4. Have meaningful, inspiring ideas and scientific works in mathematics that are recognised by the local and Asian level community and beneficial to society.

D. PROGRAM LEARNING OUTCOMES (PLO)

General procedures of graduate profile formation, learning outcome, and curriculum of study program have been in accordance with the standard (from guidelines of curriculum development, such as Higher Education and Profession Association, KKNI, Accreditation Bureau, and Association Profession of Study Program) as presented in Figure 1 and verified by academic board of faculty. The procedure involves both internal and external stakeholders, including academic staff, university and faculty supporter, alumni, students, experts, and external stakeholders.

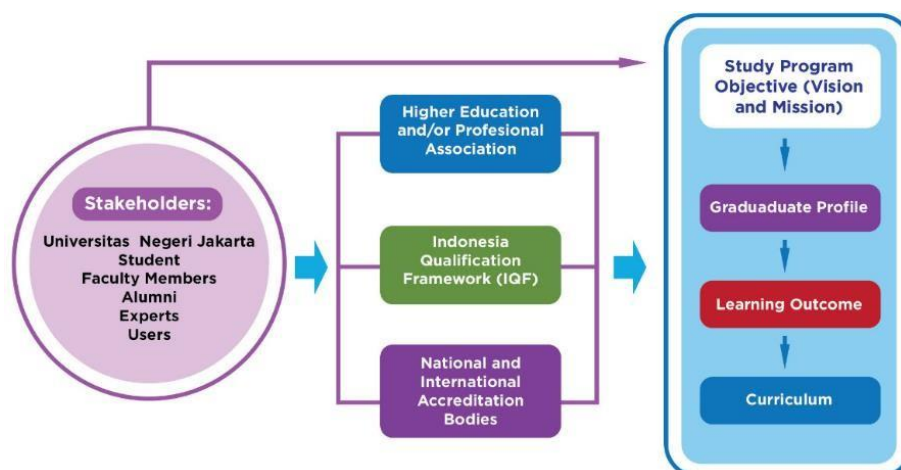


Figure 1 Design of Mechanism Scheme of Program Learning Outcomes

Learning Outcomes of bachelor's degree of Mathematics Study Program are presented in Table 2. The PLO's are classified into two areas, namely social competence, and specialist competence.

Table 2 The PLO of Bachelor of Mathematics Study Program

Area	Code	Program Learning Outcome
Social Competences	PLO 1	Uphold the values of humanity in accordance with religion, morals, and ethics.
	PLO 2	Internalize the spirit of independence, struggle and Internalize independence, perseverance, and entrepreneurship.
	PLO 3	Able to maintain and expand professional networks with supervisors, colleagues, and peers inside and outside the organization.
	PLO 4	Able to conduct self-evaluation on the team under their responsibility and to manage teaching and learning independently.
Specialist Competences	PLO 5	Able to make appropriate decisions to solve problems within their expertise, based on information and data analysis.
	PLO 6	Able to document, store, secure, and retrieve data to ensure validity and to prevent plagiarism.
	PLO 7	Master the theories of mathematical concepts, e.g. mathematical logic, discrete mathematics, algebra, analysis and geometry, probability, and statistics..
	PLO 8	Master the principles of mathematical modeling, linear programming, differential equations, dan numerical methods..
	PLO 9	Capable to conduct research independently or in groups that can be used to guide stakeholders in choosing diverse alternative solutions to problems in mathematics.

Area	Code	Program Learning Outcome
	PLO 10	Able to develop mathematical thinking, from procedural/computational understanding to advanced understanding, including exploration, logical reasoning, generalization, abstraction, and formal proving.
	PLO 11	Able to observe, recognize, formulate, and solve problems through a mathematical approach with or without software.

The relation of PLO and PEO of Bachelor of Mathematics study program is described in the matrix below.

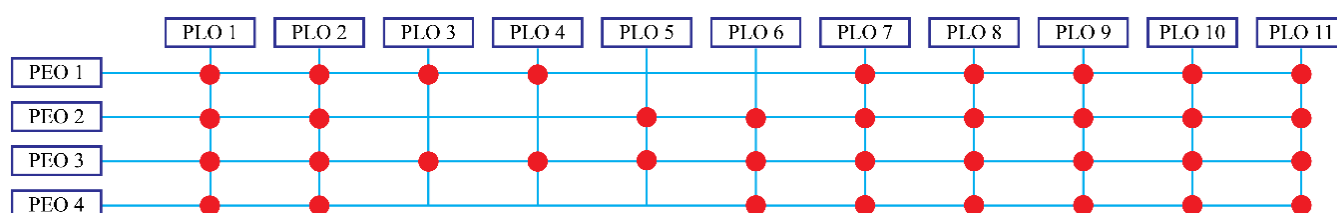


Figure 2 Matrix of PLO and PEO of Bachelor of Mathematics Study Program

Subject-specific criteria are developed based on the classification of mathematics study program body of knowledge and its PLO during the course determination. The description of Subject-Specific Criteria (SSC) for the Bachelor of Mathematics study program is presented in Table 3.

Table 3 The SSC of Bachelor of Mathematics Study Program

SSC (Subject-Specific Criteria)		
Specialist competences	SSC 1	Possesses profound knowledge of the fundamentals and application of logical mathematics, discrete mathematics, algebra, analysis and geometry, probability theory, and statistics.
	SSC 2	Is familiar with relevant practical standard software.
	SSC 3	Is able to identify, explain the quality of simple mathematical problems, and generalise simple mathematical problems.
	SSC 4	Is able to generalise simple mathematical problems.
	SSC 5	Is able to solve simple practical problems by applying fundamental mathematical methods.
	SSC 6	Recognises the mathematically formal structure of simple problems.
	SSC 7	Formally and correctly proves simple mathematical statements with facts and

SSC (Subject-Specific Criteria)		
		methods that students are familiar with.
	SSC 8	Master fundamental strategies for transferring methods in Mathematics.
	SSC 9	Creates simple, realistic mathematical problems under supervision.
	SSC 10	Implement simple, mathematical processes on the computer.
	SSC 11	Is able to work on and present mathematical problems scientifically by applying various mathematical concepts.
	SSC 12	Within the framework of Bachelor activities, works on a simple and clearly defined scientific task and is able to adequately present the results orally and in writing.
Sosial Competences	SSC 13	Is able to maintain and develop a network with mentors, colleagues, peers both inside and outside the institution.
	SSC 14	Is able to carry out the process of self-evaluation of work groups under their responsibility, and able to manage learning independently.

The relevance between PLO and SSC is described below.

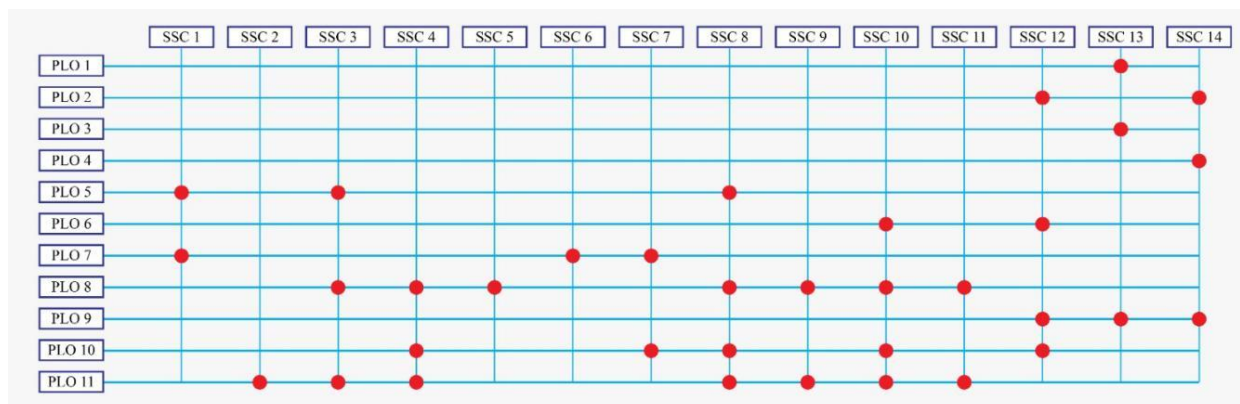


Figure 3 Matrix of PLO and SSC of Bachelor of Mathematics Study Program

E. PROGRAM STRUCTURE

The Mathematics Study Program is one such program studies at the Faculty of Mathematics and Natural Sciences Universitas Negeri Jakarta, which its establishment is based on the Decree of the Establishment of the Study Program by the Directorate General of Higher Education (Dirjen DIKTI) No.1059/D/T/2002, while administering study programs based on the Decree on Operational Permits by the Director General of Higher Education 5450/D/T/K-N/2011. The contents of curriculum in Mathematics Study Program Curriculum is designed in accordance with the vision, mission, goals and objectives of the study program, with reference to various competencies that must be mastered by

graduates which includes attitude competence, knowledge, general skills and special skills.

Several policies issued by the Ministry Education and Culture, and university require changes to the existing curriculum implemented in the Mathematics Study Program at FMIPA UNJ. Therefore In addition, study programs must also carry out curriculum development which includes four components that characterize of the university, that is 21st century skills, Outcome Based Education (OBE), Digital Literacy, and Independent Learning Independent Campus, namely Merdeka Belajar Kampus Merdeka (MBKM).

The process of achieving the expected qualification profile is carried out through the main program lecture activities with a minimum number of 144 credits or equivalent to 216 ECTS. Learning activities can be completed within eight semesters but no more than 14 semesters.

Curriculum structure the Bachelor of Mathematics study program consists of 5 groups of course (Group of university's course, faculty's course, compulsory course, elective course, and Independent Learning Activities Course (MBKM)). The course structure of Bachelor Mathematics Study Program is presented in Table 4.

Table 4 Course structure of Mathematics Study Programme in terms of obligations

No	Types of Courses	Total (In Credits)	Total (In ECTS)
1	University's Courses	14	21
2	Faculty's course	3	4,5
3	Compulsory Courses	89	133,5
4	Elective Course	18	27
5	Independent Learning Activities Course (MBKM)	20	30
Total		144	216

Students who successfully complete their studies in the mathematics study program are entitled to hold a bachelor's degree in mathematics, namely Sarjana Matematika (S.Mat). To achieve it, the students must complete at least 144 credit hours of courses (as shown in Table 4) in 8 to 14 semesters of study.

The course distribution is hierarchically arranged, which illustrates that the courses of the semester above are an extension of courses from the previous semester. The distribution is based on the relationship between concepts, levels of knowledge, and course mapping that some of the upper semester courses have the preconditions in the previous semester.

The curriculum is developed through a series of processes from the body of knowledge up to curriculum structure. The curriculum structure will guide students to achieve competencies that have been set and meet the PLO of Bachelor of Mathematics Study Program. Intended competencies that students can acquire after taking one course can be seen from the course module. Courses

are designed from the core subject matter. There are 7 subject matters of Bachelor of Mathematics study program as presented in Table 5.

Table 5 Subject Matter of Bachelor of Mathematics Study Program

Code	Subject Matter	Descriptions	Courses
SM1	General Basic Knowledge	This study material aims to shape the students' characters, improve students' communication skills, and develop students' logic and systematic thinking.	<ol style="list-style-type: none"> 1. Pancasila, 2. Indonesian Language, 3. Olympism, 4. Religion, 5. Civic Education, 6. Concept of Education, 7. Philosophy of Science, 8. Logical and Scientific Reasoning, 9. English, 10. English for Mathematics, 11. Entrepreneurship, 12. Business Communication
SM2	Geometry and Analysis	In this study material, various theoretical analysis reviews are discussed, starting from the basics of calculus, abstraction of the basic calculus concepts that have been discussed, specifically related to the proof of Lemmas, Theorems, and Propositions, as well as various geometric concepts that can be used in mathematical problems and the field other sciences.	<ol style="list-style-type: none"> 1. Differensial Calculus, 2. Analytical Geometry, 3. Integral Calculus, 4. Multivariable Calculus, 5. Transformation Geometry, 6. Real Analysis I, 7. Functions of a Complex Variable, 8. Calculus of Variations, Real Analysis II, 9. Measure Theory, 10. Introduction to Functional Analysis, 11. Introduction to Topology.
SM3	Algebra	This study material aims for students to master theoretical concepts, in the	<ol style="list-style-type: none"> 1. Introductory of Fundamental Mathematics, 2. Linear Algebra, 3. Number Theory,

Code	Subject Matter	Descriptions	Courses
		form of definitions, theorems, lemmas, propositions, and other properties as well as the application of algebra to real life.	4. Discrete Mathematics, 5. Graph Theory, 6. Abstract Algebra
SM4	Statistics and Probability	This study material aims for students to master the concepts of probability and statistics as well as the application to solve problems in real life.	1. Elementary Statistics, 2. Mathematical Statistics I, 3. Time Series Analysis, 4. Mathematical Statistics II, 5. Sampling Theory, 6. Introduction to General Linier Model, 7. Non Parametric Statistics, 8. Probability Theory, Risk Theory, 9. Stochastic Process
SM5	Applied Mathematics	This study material aims for students to be able to choose mathematical tools or formulas that are abstract in nature to be used in solving mathematical contextual problems.	1. Linear Programming, 2. Operation Research, 3. Mathematical Economics, 4. Dynamical System, 5. Financial Mathematics, 6. Optimum Control Theory, 7. Elementary Differential Equations, 8. Partial Differential Equations, 9. Mathematical Modelling, 10. Theory of Investment and Asset, 11. Insurance Mathematics
SM6	Computation	This study material aims for students to solve problems related to computation.	1. Programming Algorithm, 2. Parallel Computing, 3. Numerical Methods, 4. Data Structure, 5. Big Data and Programming, 6. Design and Analytical Algorithm
SM7	Final Project	This study material aims for students to master the techniques/skills	1. Research Methodology, 2. Mathematics Seminar, 3. Field Working Practical, 4. Field Working Lecture,

Code	Subject Matter	Descriptions	Courses
		of writing scientific papers, presenting the research results, and learning to socialize and adapt to the work environment that will be faced later.	5. Seminar of Pre Undergraduate Thesis, 6. Undergraduate Thesis

The curriculum structure mapping towards PLO of Mathematics Study Program is presented in table 6 below.

Table 6 Curriculum structure mapping towards PLO of Bachelor of Mathematics Study Program

Course code	Course Name	CP	ECTS	PLO										
				1	2	3	4	5	6	7	8	9	10	11
Semester 1														
3005-004-2	English	2	3			√	√							
0005-155-2	Pancasila	2	3	√	√									
0005-313-2	Indonesian Language	2	3			√	√							
3005-112-1	Olympism	1	1,5		√	√								
3125-201-2	Introductory of Fundamental Mathematics	2	3							√			√	
3125-202-2	Number Theory	2	3							√			√	
3125-203-4	Linear Algebra	4	6							√			√	
3125-501-3	Elementary Statistics	3	4,5					√		√				
3125-939-4	Differential Calculus	4	6							√	√			√
Total CP		22	33											
Semester 2														
0005-312-2	Religion	2	3	√		√								
0005-111-2	Civic Education	2	3	√	√									
3125-204-3	Linear Programming	3	4,5					√			√	√		√
3125-601-3	Programming Algorithm	3	4,5					√			√		√	√
3125-604-3	Analytical Geometry	3	4,5					√		√				√
3125-901-3	Discrete Mathematics	3	4,5					√		√			√	√
3125-940-4	Integral Calculus	4	6							√				√
0005-318-2	Pondation of Education	2	3	√	√	√	√							
Total CP		22	33											
Semester 3														
3125-956-2	Philosophy of	2	3	√		√	√							

Course code	Course Name	CP	ECTS	PLO													
				1	2	3	4	5	6	7	8	9	10	11			
	Science																
3125-004-2	English for Mathematics	2	3			√											
3125-602-3	Numerical Methods	3	4,5					√		√	√	√	√	√	√	√	√
3125-941-4	Multivariable Calculus	4	6							√				√	√		
3125-942-3	Elementary Differential Equations	3	4,5							√	√	√	√	√	√	√	√
0005-319-2	Big Data and Programming	2	3					√	√	√	√						
	Elective Course:	3	4,5														
3125-003-2	<i>Graph Theory</i>	2	3							√				√			
3125-906-3	<i>Data Structure</i>	3	4,5					√	√	√							
3125-804-3	<i>Financial Mathematics</i>	3	4,5							√				√	√		
3125-301-3	<i>Transformation Geometry</i>	3	4,5					√		√				√	√		
Total CP		19	28,5														
Semester 4																	
3125-401-3	Real Analysis I	3	4,5							√				√			
3125-403-3	Functions of a Complex Variable	3	4,5							√				√			
3125-503-3	Mathematical Statistics I	3	4,5							√				√			
3125-938-3	Entrepreneurship	3	4,5	√													
3125-950-3	Partial Differential Equations	3	4,5				√				√					√	
'00053202	Logic and Reasoning	2	3							√				√			
	Elective Courses:	3	4,5														
3125-007-3	<i>Dynamical System</i>	3	4,5								√			√	√		
3125-706-3	<i>Time Series Analysis</i>	3	4,5					√		√						√	
3125-947-3	<i>Design and Analytical Algorithm</i>	3	4,5					√			√			√			
3125-932-3	<i>Mathematical Economics</i>	3	4,5							√	√					√	
31250133	<i>Calculus of Variations</i>	3	4,5							√				√	√		
Total CP		20	30														
Semester 5																	
3125-053-2	Research Methodology	2	3						√			√		√			
3125-205-4	Abstract Algebra	4	6							√				√			
3125-402-3	Real Analysis II	3	4,5							√				√			
3125-504-3	Mathematical Statistics I	3	4,5							√						√	
	Elective Courses:	6	9														

Course code	Course Name	CP	ECTS	PLO											
				1	2	3	4	5	6	7	8	9	10	11	
31250113	<i>Theory of Investment and Asset</i>	3	4,5					√			√				
31250123	<i>Optimum Control Theory</i>	3	4,5									√			√
31257013	<i>Sampling Theory</i>	3	4,5						√	√		√			
31250143	<i>Parallel Computing</i>	3	4,5						√	√					
Total CP		18	27												
Semester 6															
3125-051-2	Mathematics Seminar	2	3			√	√	√	√	√		√	√	√	√
3125-505-3	Stochastic Process	3	4,5					√		√			√	√	
3125-933-3	Operation Research	3	4,5					√					√	√	
3125-946-3	Mathematical Modelling	3	4,5								√	√			
3125-954-2	Business Communication	2	3			√		√							
	Elective Courses:	6	9												
3125-704-2	<i>Non Parametric Statistics</i>	2	3							√					√
3125-718-3	<i>Probability Theory</i>	3	4,5							√					
3125-808-3	<i>Insurance Mathematics</i>	3	4,5					√		√		√			√
3125-404-3	<i>Introduction to Topology</i>	3	4,5							√					√
Total CP		19	28,5												
Semester 7 MBKM															
3125-005-6	Field Working Practical	6	9		√	√	√		√						√
3125-957-2	Seminar of Pre Undergraduate Thesis	2	3		√	√		√	√						
	Elective Courses:	12	18												
0005-300-2	<i>Field Working Lecture</i>	2	3		√		√					√			
3125-405-3	<i>Measure Theory</i>	3	4,5									√			√
3125-951-3	<i>Risk Theory</i>	3	4,5					√		√					
31250003	<i>Introduction to Functional Analysis</i>	3	4,5							√			√		
3125-015-3	<i>Introduction to General Linier Model</i>	3	4,5							√	√				√
Total CP		20	30												
Semester 8															
3005-402-4	Undergraduate Thesis	4	6		√	√		√	√			√			√
Total CP		4	6												

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

The structure and course (module) in the Bachelor of Mathematics study

programme consists of 144 credit hours (SKS). The study programme courses consists 106 credit hours (SKS) of compulsory courses focusing on general and basic competences for a bachelor degree in mathematics. The elective courses offered to the students consist of 18 credit hours and 20 credit hours of MBKM. The curriculum structure in the Bachelor of Mathematics study programme has been divided into four years programme intentions. Each course contributes to PLO in the Mathematics study programme, as shown in Figure 4. In the Figure 4, the green boxes indicate University’s courses, the purple boxes indicate Faculty’s courses, the yellow boxes indicate compulsory courses, and the red boxes indicate elective courses.

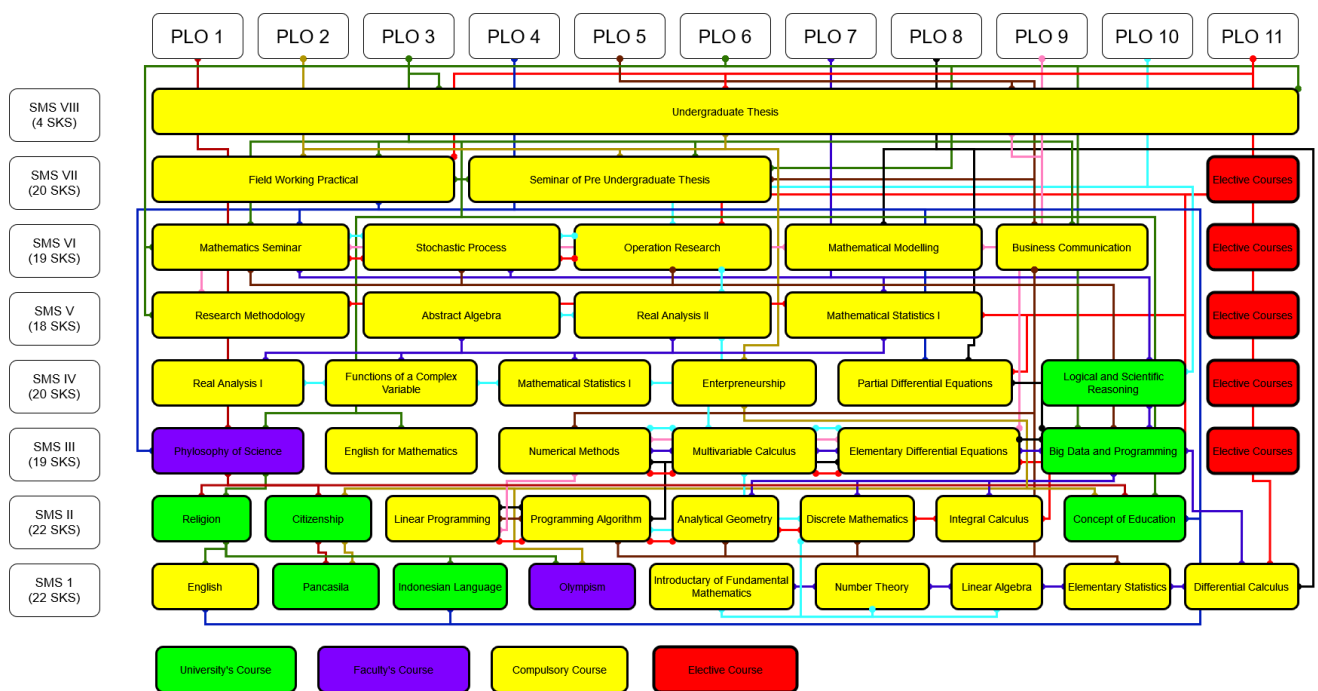


Figure 4 Course mapping based on Courses and PLO in Bachelor of Mathematics Study Program

Furthermore, please visit our website at <https://fmipa.unj.ac.id/math/> for more related information about Bachelor of Mathematics Study Program.



*Mencerdaskan dan
Memartabatkan Bangsa*

**Faculty of Mathematics and Natural Science
Universitas Negeri Jakarta**

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