Ministry of Higher Education, Science and Technology
Yogyakarta State University
FACULTY OF MATHEMATICS AND NATURAL SCIENCES

CURRICULUM
MATHEMATICS EDUCATION
STUDY PROGRAM

2025

FOREWORD TO THE STUDY PROGRAM

Peace be upon you, and Allah's mercy and blessings,
Best wishes for all of us,

We express our gratitude to the presence of God Almighty for the abundance of His grace and gifts, so that the Undergraduate Program in Mathematics Education, Faculty of Mathematics and Natural Sciences, Yogyakarta State University, can complete this 2025 Curriculum document as a result of the continuous evaluation and development process.

As an institution providing education for prospective mathematics teachers, the Mathematics Education Study Program has a significant responsibility to produce graduates who not only possess strong academic competencies but also character, innovation, and the ability to respond to the challenges of the times. Therefore, this revised curriculum is designed with reference to various national regulations and policies, including the Independent Learning–Independent Campus (MBKM) policy, the National Higher Education Standards (SN-DIKTI), and the latest developments in mathematics education and learning technology.

The 2025 Curriculum is designed to support the development of graduates as pedagogically and professionally superior mathematics educators, adaptable to learning innovations, and possessing critical, creative, communicative, and collaborative thinking skills. Furthermore, the involvement of various stakeholders in the curriculum development process is crucial in ensuring a relevant and contextual curriculum.

We express our deepest gratitude and appreciation to the curriculum development team, lecturers, students, alumni, school partners, and all parties who have provided contributions, input, and a collaborative spirit in the process of developing this curriculum.

We hope this curriculum can serve as a strong foundation for the implementation of a superior, humanistic, and transformative educational process in the Undergraduate Mathematics Education Program at the Faculty of Mathematics and Natural Sciences, UNY. May God Almighty continue to provide guidance and blessings in every step of our service.

Peace be upon you and Allah be upon you.

Yogyakarta, April 14, 2025
Coordinator of the Undergraduate Mathematics Education Study Program
Faculty of Mathematics and Natural Sciences, Yogyakarta State University

Dr. Kuswari Hernawati, S.Si, M.Kom

LIST OF CONTENTS

A. Vision, Mission, and Objectives of the Study Program

1. Scientific Vision of the Undergraduate Mathematics Education Study Program

To become a superior and innovative study program in producing graduates who are creative, adaptive, and have a global perspective, as well as mastering mathematical content, didactic pedagogy, cognitive psychology, and learning technology to create quality mathematics education.

2. Study Program Mission

a. Organizing superior, creative, and innovative mathematics education to produce graduates who are creative, adaptive, and have a global perspective, as well as mastering mathematical content, didactic pedagogy, cognitive psychology, and mathematics learning technology, and have adaptive abilities and global insights to support quality education in the modern era.

b. Conducting in-depth, innovative research in the field of mathematics education based on pedagogical-didactic studies, cognitive psychology, and mathematics learning technology, to make a real contribution to the needs of the global community and the development of quality education.

c. Carrying out community service oriented towards the application of mathematical didactic science through the development of learning strategies based on cognitive psychology, and the use of educational technology, in order to improve the quality of mathematics learning, empower the educational community, and provide relevant contributions locally and globally.

d. Organizing good, transparent, and accountable study program governance, as well as fostering strategic and sustainable collaboration with various parties, both at the national and international levels, in the fields of education, research, and community service to support the development of mathematical didactic science based on cognitive psychology, and mathematics learning technology.

3. Study Program Objectives

a. Formulation of Study Program Objectives

TP 1: Producing graduates who are creative, adaptive, and have a global perspective, as well as mastering mathematical content, didactic pedagogy, cognitive psychology, and learning technology to support quality education in the modern era.

TP 2: Producing innovative and in-depth research in the field of mathematics education based on didactic pedagogy, cognitive psychology, and learning technology, which makes a real contribution to the development of education at the national and global levels.

TP 3: Produce community service programs that are oriented towards the application of mathematical didactic science through cognitive psychology-based learning strategies and learning technology, in order to improve the quality of mathematics learning and empower the educational community.

TP 4: Produce good, transparent, and accountable study program governance, which supports the development of mathematical didactic science based

on cognitive psychology and learning technology, through strategic collaboration with various parties at the national and international levels.

B. Graduate Profile and Profile Description

The graduate profile is designed to reflect the core competencies required of graduates, in line with the vision, mission, and objectives of the study program. The determination of this graduate profile also takes into account the needs of the workforce, developments in science and technology, and national regulations in higher education. The following table describes the expected graduate profile of the Mathematics Education Undergraduate Study Program.

Profile of graduates of the Bachelor of Mathematics Education study program, FMIPA UNY.

Graduate Profile	Profile Description
Mathematics Educator	Mathematics educators who are religious, nationalistic, creative, adaptive, have a global perspective, and master mathematical content, and are able to design and implement learning strategies based on didactic pedagogy, cognitive psychology, and learning technology supported by a healthy body.
Developer of Mathematics Learning Resources and Media	developers of learning resources and printed and digital learning media that are innovative, interactive, and in line with technological developments and the needs of mathematics learning
Education Manager	Professional managers of formal and non-formal educational institutions who have managerial skills.

C. Formulation of Learning Outcomes

The Graduate Learning Outcomes (CPL) for the Undergraduate Mathematics Education Study Program contains the formulation of graduate learning outcomes (CPL) that must be achieved by students after completing the entire educational process in the Undergraduate Mathematics Education Study Program. This CPL is compiled based on the Indonesian National Qualifications Framework (KKNI) and the National Higher Education Standards (SN-Dikti), and takes into account the professional competency needs of prospective mathematics educators. The CPL covers aspects of attitudes, knowledge, general skills, and specific skills that serve as the basis for curriculum development, learning tools, and student achievement assessment.

CPL Undergraduate Program in Mathematics Education

Graduate Learning Outcomes (CPL)
CPL 1. Demonstrate professional, ethical and responsible attitudes both as individuals and citizens.
CPL2: Be adaptive and innovative in facing developments in science, technology, and student needs.
CPL 3. Comprehensively master various concepts of school mathematics and advanced mathematics
CPL 4. Master the principles of didactic pedagogy and cognitive psychology in mathematics learning to understand the way of thinking and characteristics of students.
CPL 5. Mastering the applicable mathematics education curriculum, both nationally and internationally, and being able to adapt it to the needs of students and developments of the times.
CPL 6. Able to think critically, creatively, and provide solutions in solving problems and adapting to global developments in the world of mathematics education.
CPL 7. Able to communicate effectively, both orally and in writing, in conveying mathematical concepts and learning strategies to students, colleagues, and the community.
CPL 8. Able to work in multidisciplinary teams and demonstrate leadership and managerial skills in learning management, educational policy development, and educational institution management.
CPL9: Able to design, implement, and evaluate mathematics learning based on didactic pedagogical theory and cognitive psychology to improve students' understanding.
CPL10: Able to develop and utilize learning technologies, such as manipulative media, interactive media, digital-based learning, and artificial intelligence in mathematics education.
CPL 11. Able to analyze mathematics learning difficulties in students and design appropriate intervention strategies based on a cognitive psychology approach.
CPL 12. Able to innovate in mathematics learning through research and development of effective learning models that are in line with current developments.

D. Curriculum Structure

The Mathematics Education Study Program curriculum is designed with a study load of 144 credits and a curriculum duration of eight semesters. Therefore, students can graduate after completing 144 credits. The details of the course groups and the number of credits are presented in the following table.

No	EyeStudying	Number of credits
1.	Compulsory Curriculum Courses (MKWK)	8
2.	Compulsory University Courses (MKWU)	6
3.	Faculty Courses (MKF)	4
4.	Study Program Scientific Foundation Course (MKPKP)	80
5.	Basic Education Course (MKDK)	10
6.	Learning Process Skills Course (MKKPP)	10
7.	Off-Campus Learning Courses (MKPLK)	12
8.	Scientific Development Course (MKPK)	11
9.	Additional Competency Courses (MKTK)	3
TotalCredits		**144**

The compilation of the number of credits in each group aims to ensure a balance between mastery of theory, learning practice, and the development of 21st-century competencies that are relevant for prospective professional educators.

Course Groups and Credit Units for Bachelor of Education

No	Course Code	Course Name	Credit details			Amount	Prerequisite	Semester	
			T	P	L			Odd	Even
COMPULSORY CURRICULUM COURSES (MKWK)									
1	MWK60201	Islamic education*	2			2		1	
	MWK60202	Catholic Religious Education*	2					1	
	MWK60203	Protestant Christian Religious Education *	2					1	
	MWK60204	Hindu Religious Education*	2					1	
	MWK60205	Buddhist Religious Education*	2					1	
	MWK60206	Confucian Religious Education*	2					1	
2	MWK60207	Civic education	2			2		3	
3	MWK60208	Pancasila	2			2			2
4	MWK60209	Indonesian	2			2			4
		Subtotal credits				**8**			
COMPULSORY UNIVERSITY COURSES (MKWU)									
1	MWU60201	English for Special Purposes	2					1	

No	Course Code	Course Name	T	P	L	Amount	Prerequisite	Odd	Even
			Credit details			**Amount**	**Prerequisite**	**Semester**	
2	MWU60202	Sports and Physical Fitness		2		2			2
3	MWU60203	Educationn and Sustainable Development	2			2		3	
		Subtotal credits				**6**			

COMPULSORY FACULTY COURSES (MKF)

No	Course Code	Course Name	T	P	L	Amount	Prerequisite	Odd	Even
1	FMI60201	Insight and Study of Mathematics and Natural Sciences	2			2			4
2	FMI60202	Basic Statistics	1	1		2		1	
		Subtotal credits				**4**			

SCIENTIFIC FOUNDATION COURSES OF THE STUDY PROGRAM (MKPKP)

COMPULSORY COURSES

No	Course Code	Course Name	T	P	L	Amount	Prerequisite	Odd	Even
1.	SPM60301	Algebra and Trigonometry	2	1		3		1	
2.	SPM60302	Differential Calculus	2	1		3		1	
3.	SPM60303	Logic and Sets	2	1		3		1	
4.	SPM60305	Linear Algebra	3	1		4			2
5.	SPM60206	Plane Geometry	2			2			2
6.	SPM60307	Integral Calculus	2	1		3	SPM60302		2
7.	SPM60208	Psychology of Learning Mathematics	2			2			2
8.	SPM60309	Advanced Statistics	2	1		3	FMI600202		2
9.	SPM60211	Geometry of Space	2			2	SPM60206	3	
10.	SPM60210	Computer Applications	1	1		2		3	
11.	SPM60211	Geometry of Space	2			2	SPM60205	3	
12.	SPM60312	Advanced Calculus	2	1		3	SPM60306	3	
13.	SPM60216	Number Theory	2			2	SPM60303	3	
14.	SPM60312	Advanced Calculus	2	1		3	SPM60306	3	
15.	SPM60314	Differential Equations	2	1		3	SPM60302	3	
16.	SPM60315	Linear Program	2	1		3	SPM60304	3	
17.	SPM60216	Number Theory	2			2	SPM60303	3	
18.	SPM60218	Analytical Geometry of Plane	2			2	SPM60206		4
19.	SPM60219	Innovation in Manipulative Mathematics Learning Media	2			2			4
20.	SPM60220	Middle School Mathematics Study 1	2			2			4
21.	SPM60223	Introduction to Abstract Algebra	2			2			4
22.	SPM60324	Probability Theory	2	1		3	SPM60312		4
23.	SPM60217	Algorithms and Programming	2			2		5	

No	Course Code	Course Name	T	P	L	Amount	Prerequisite	Odd	Even
			Credit details			**Amount**	**Prerequisite**	**Semester**	
24.	SPM60225	Real Analysis	2			2		5	
25.	SPM60226	Philosophy of Mathematics Education	2			2		5	
26.	SPM60227	Analytical Geometry of Space	2			2	SPM60211	5	
27.	SPM60228	Middle School Mathematics Study 2	2			2		5	
28.	SPM60229	Discrete Mathematics	2			2	SPM60303	5	
29.	SPM60231	Numerical Methods	2			2		5	
30.	SPM60333	Mathematics Learning Planning	2	1		3		5	
31.	SPM60234	History of Mathematics	2			2		5	
32.	SPM60235	Transformation Geometry	2						

No	Course Code	Course Name	T	P	L	Amount	Prerequisite	Odd	Even
			Credit details			**Amount**	**Prerequisite**	**Semester**	
ELECTIVE COURSES FOR THE MATHEMATICS EDUCATION STUDY PROGRAM									
1.	SPM60337	English Mathematics	3			3			6
2.	SPM60338	Mathematical Thinking Study	2	1		3			6
3.	SPM60239	International Mathematics Education Study	2			2			6
4.	SPM60340	AI-based Learning Media	2	1		3			6
5.	SPM60241	Ethnomathematics	2			2			6
6.	SPM60342	Selected Chapters on Mathematics Education	3			3			6
7.	SPM60243	STEM Learning Approach	2			2			6
8.	SPM60244	Qualitative Research on Mathematics Education	2			2			6
9.	SPM60245	Geometry System	2			2			6
10.	SPM60246	Graph Theory	2			2			6
11.	SPM60247	Development of Mathematics Learning Videos	1	1		2			6
		Subtotal credits				**21**			
BASIC EDUCATION COURSES (MKDK)									
1.	MWP60201	Filmu Education	2			2		1	
2.	MWP60202	Psychologisti Education	2			2		1	
3.	MWP60203	Managementn Education	2			2			6
4.	MWP60204	Sociologisti and Educational Anthropology	2			2			2
5.	MWP60205	Educationn Inclusion	2			2			6

No	Course Code	Course Name	Credit details			Amount	Prerequisite	Semester	
			T	P	L			Odd	Even
		Subtotal credits				**10**			

No	Course Code	Course Name	Credit details			Amount	Prerequisite	Semester	
			T	P	L			Odd	Even
LEARNING PROCESS SKILLS COURSE (MKKPP)									
1.	SPM60221	Mathematics Curriculum and Learning	2			2			4
2.	SPM60222	Mathematics Learning Model	2			2			4
3.	SPM60230	Interactive Mathematics Learning Media	1	1		2		5	
4.	SPM60232	Mathematics Learning Assessment	2			2		5	
5.	SPM60236	Microlearning		1	1	2			6
		Subtotal credits				10			
MATA OFF-CAMPUS LEARNING COURSE (MKPLK)									
1	MLK60601	Peducational practices			6	6		7	
2	MLK60605	Lectureh Real Work			6	6		7	
		Subtotal credits				**12**			
MATA SCIENTIFIC DEVELOPMENT COURSE (MKPK)									
1	MKK60301	Methodologyi Research	2	1		3			6
2	MKK60801	Tasks End			8	8			8
		Subtotal credits				**11**			
ADDITIONAL COMPETENCY COURSES (MKTK)									
1	SPM60213	Creativity, Innovation, and Entrepreneurship	1		1	2		2	
2	SPM60304	Basic Statistics Lab		1		1		1	
		Subtotal credits				3			

E. Distribution of Courses per Semester

The distribution of courses per semester is structured based on the sequence of learning outcomes, logical prerequisites between courses, and student study load to maintain a proportional balance each semester. Courses at the beginning of the semester are aimed at equipping students with the basics of knowledge and personality, while courses in subsequent semesters become increasingly applied and integrative, supporting the achievement of the overall profile of a mathematics education graduate. This distribution also considers continuity between courses and the relevance of the material to the development of prospective teachers' pedagogical, professional, social, and personality competencies.

Semester 1

No	Code	Course Name	T	P	L	Amount	Prerequisite
1	MWK60201	Islamic education*	2			2	
	MWK60202	Catholic Religious Education*	2				
	MWK60203	Protestant Christian Religious Education *	2				
	MWK60204	Hindu Religious Education*	2				
	MWK60205	Buddhist Religious Education*	2				
	MWK60206	Confucian Religious Education*	2				
2	MWP60201	Educational Science	2			2	
3	MWP60202	Educational Psychology	2			2	
4	MWU60201	English for Special Purposes	2			2	
5	FMI600202	Basic Statistics	2			2	
6	SPM60301	Algebra and Trigonometry	2	1		3	
7	SPM60302	Differential Calculus	2	1		3	
8	SPM60303	Logic and Sets	2	1		3	
9	SPM60101	Basic Statistics Lab		1		1	
		Number of credits				20	

Semester 2

No	Code	Course Name	T	P	L	Amount	Prerequisite
1	MWK60208	Pancasila	2			2	
2	MWP60204	Sociology and Anthropology of Education	2			2	
3	MWU60202	Sports and Physical Fitness		2		2	
4	SPM60401	Linear Algebra	3	1		4	
5	SPM60201	Plane Geometry	2			2	
6	SPM60304	Integral Calculus	2	1		3	SPM60401
7	SPM60202	Psychology of Learning Mathematics	2			2	
8	SPM60305	Advanced Statistics	2	1		3	FMI600202
		Number of credits				20	

Semester 3

No	Code	Course Name	T	P	L	Amount	Prerequisite
1	MWK60207	Civic education	2			2	

No	Code	Course Name	T	P	L	Amount	Prerequisite
2	MWU60203	Education and Sustainable Development	2			2	
3	SPM60203	Computer Applications	2			2	
4	SPM60204	Geometry of Space	2			2	0
5	SPM60306	Advanced Calculus	2	1		3	SPM60203
6	SPM60205	Creativity, Innovation, and Entrepreneurship	1		1	2	
7	SPM60307	Differential Equations	2	1		3	MWU60203
8	SPM60308	Linear Program	2	1		3	SPM60211
9	SPM60206	Number Theory	2			2	SPM60227
		Number of credits				21	

Semester 4

No	Code	Course Name	T	P	L	Amount	Prerequisite
1	FMI60201	Insight and Study of Mathematics and Natural Sciences	2			2	
2	MWK60209	Indonesian	2			2	
3	SPM60207	Algorithms and Programming	2			2	
4	SPM60208	Analytical Geometry of Plane	2			2	MWU60203
5	SPM60209	Innovation in Manipulative Mathematics Learning Media	2			2	
6	SPM60210	Middle School Mathematics Study 1	2			2	
7	SPM60211	Mathematics Curriculum and Learning	2			2	
8	SPM60212	Mathematics Learning Model	2			2	
9	SPM60213	Introduction to Abstract Algebra	2			2	
10	SPM60309	Probability Theory	2	1		3	SPM60211
		Number of credits				21	

Semester 5

No	Code	Course Name	T	P	L	Amount	Prerequisite
1	SPM60214	Introduction to Real Analysis	2			2	
2	SPM60215	Philosophy of Mathematics Education	2			2	

No	Code	Course Name	T	P	L	Amount	Prerequisite
3	SPM60216	Analytical Geometry of Space	2			2	SPM60308
4	SPM60217	Middle School Mathematics Study 2	2			2	
5	SPM60218	Discrete Mathematics	2			2	SPM60228
6	SPM60219	Interactive Mathematics Learning Media	2			2	
7	SPM60220	Numerical Methods	2			2	
8	SPM60221	Mathematics Learning Assessment	2			2	
9	SPM60310	Mathematics Learning Planning	2	1		3	
10	SPM60222	History of Mathematics	2			2	
		Number of credits				21	

Semester 6

No	Code	Course Name	T	P	L	Amount	Prerequisite
1	MKK60301	Research methodology	2	1		3	
2	MWP60203	Educational Management	2			2	
3	MWP60205	Inclusive Education	2			2	
4	SPM60223	Transformation Geometry	2			2	
5	SPM60224	Microlearning	2			2	
6		MK Elective				10	
		Number of credits				21	

Semester 7

No	Code	Course Name	T	P	L	Amount	Prerequisite
1	MLK60601	Educational Practice			6	6	
2	MLK60605	Community Service Program			6	6	
		Number of credits				12	

Semester 8

No	Code	Course Name	T	P	L	Amount	Prerequisite
1	MKK60801	Thesis			8	8	
		Number of credits				8	

ELECTIVE COURSES (Semester 6)

No	Code	Course Name	T	P	L	Amount	Prerequisite
1	SPM60311	English Mathematics	3			3	
2	SPM60312	Mathematical Thinking Study	2	1		3	

No	Code	Course Name					
3	SPM60225	International Mathematics Education Study	2			2	
4	SPM60313	AI-based Learning Media	2	1		3	
5	SPM60226	Ethnomathematics	2			2	
6	SPM60314	Selected Chapters on Mathematics Education	3			3	
7	SPM60227	STEM Learning Approach	2			2	
8	SPM60228	Qualitative Research on Mathematics Education	2			2	
9	SPM60229	Geometry System	2			2	
10	SPM60230	Graph Theory	2			2	
11	SPM60231	Development of Mathematics Learning Videos	1	1		2	

F. Course Description

1. Compulsory Curriculum Subject Groups

1) MWK60201 Islamic Religious Education
Prerequisite courses: -

The Islamic Religious Education course is mandatory for all Muslim students in all study programs at universities. This course is designed to strengthen students' faith and piety towards Allah SWT, as well as to develop noble morals (character), and to broaden their scientific and religious horizons. This will produce Muslim students with noble character, philosophical thinking, rational and dynamic attitudes, and broad perspectives, while taking into account the demands of fostering harmony among fellow human beings, both within the same religious community and with other religious communities.

MWK60202 Catholic Religious Education
Prerequisite courses: -

The Catholic Religious Education course is compulsory for all Catholic students in all study programs, with a weight of 3 credits. This course is designed with the intention of strengthening faith and piety in God Almighty, as well as broadening the perspective of religious life, so that students are formed with noble character, philosophical thinking, rational and dynamic attitudes and broad views, while paying attention to the demands of respect within one community, and in harmonious relations between religious communities. Lecture activities are carried out using lectures, dialogues, and paper presentations. Evaluation is carried out through written tests, assignments, and reports, as well as presentations.

MWK60203 Protestant Christian Religious Education

Prerequisite courses: -

The Christian Religious Education course is compulsory for all Christian students in all study programs, with a weight of 3 credits. This course is designed with the intention of strengthening faith and piety in God Almighty, as well as broadening the perspective of religious life, so that students are formed with noble character, philosophical thinking, rational and dynamic attitudes and broad views, while paying attention to the demands of respect within one community, and in harmonious relations between religious communities. Lecture activities are conducted using lectures, dialogues, and paper presentations. Evaluation is done through written tests, assignments, and reports, as well as presentations.

MWK60204 Hindu Religious Education

Prerequisite courses: -

Religion as understood by most Hindus is not a theory to be memorized, nor is it merely dogma, nor are words empty of meaning. Religion is a demand containing a set of values that, if practiced, will be very beneficial for oneself and for others. The Hindu Religious Education course is mandatory for every Hindu student in all study programs, weighing 3 credits. This course is designed with the intention of strengthening faith and piety in God Almighty, as well as broadening the perspective of religious life, so that students are formed with noble character, philosophical thinking, rational and dynamic attitudes and broad views, while paying attention to the demands of respect within one community, and in harmonious relations between religious communities. Lecture activities are conducted through lectures, dialogues, and paper presentations. Evaluation is done through written tests, assignments, reports, and presentations.

MWK60205 Buddhist Religious Education

Prerequisite courses: -

The Buddhist Religious Education course is compulsory for all Buddhist students in all study programs, with a weight of 3 credits. This course is designed with the intention of strengthening faith and piety in God Almighty, as well as broadening the perspective of religious life, so that students are formed with noble character, philosophical thinking, rational and dynamic attitudes and broad views, while paying attention to the demands of respecting intra-religious relations, and in harmonious relations between religious communities. Lecture activities are carried out using lectures, dialogues, and paper presentations. Evaluation is carried out through written tests, assignments, reports, and presentations.

MWK60206 Confucian Religious Education

Prerequisite courses: -

The Confucian Religious Education course covers the importance of religion in everyday life, fostering a correct attitude. This course encompasses an understanding of the sources of Confucian law, the history of Confucianism, the ability to practice the Sacred Path conveyed by the Great Teachings (Thai Hak), and the role of Confucianism in the development of science and technology.

2) MWK60207 Citizenship Education
Prerequisite courses: -

The Citizenship Education course is mandatory for all undergraduate and diploma students, with a weight of 2 credits. This course equips students with basic knowledge and skills regarding the relationship between citizens and the state, as well as preliminary education in national defense so that they become citizens who can be relied upon by their nation and state. This course examines: (1) Citizens' rights and obligations (2) Preliminary education in national defense (3) Indonesian Democracy (4) Human Rights (5) Nusantara insight as Indonesia's Geopolitics (6) National Resilience as Indonesia's Geostrategy (7) National Politics and Strategy as the Implementation of Indonesia's Geostrategy.

3) MWK60208 Pancasila
Prerequisite courses: -

This lecture discusses the foundations and objectives of Pancasila Education, Pancasila in the context of the history of the Indonesian nation's struggle, Pancasila as a philosophical system, Pancasila as political ethics and national ideology, Pancasila in the context of the Indonesian state system and Pancasila as a paradigm of life in society, nation and state.

4) MWK60209 Indonesian
Prerequisite courses: -

This course aims to equip students with the competency to use Indonesian in writing scientific papers. Topics covered include the history of Indonesian, the position and function of Indonesian, Indonesian writing grammar, paragraph development, paragraph types, reasoning in paragraphs, types of scientific papers, scientific writing formats, writing references, and writing bibliographies. Learning activities include face-to-face lectures, discussions, and structured assignments. Evaluation is carried out through written tests and structured assignments.

2. Compulsory University Courses

1) MWU60202 Sports and Physical Fitness
The Sports and Physical Fitness course (2 credits) aims to provide an understanding and practical skills regarding the importance of exercise in maintaining physical fitness. This course consists of 1 credit of theory and 1 credit of practice, enabling students to understand the basic theories of physical fitness and apply them to physical activities.

2) MWU60203 Education and Sustainable Development
The Sustainable Education and Development course aims to provide students with an understanding of the concepts, principles, and practices of sustainable development, focusing on social, economic, and environmental aspects.
In this course, students will learn the importance of education in driving positive change that supports sustainable development goals, as well as how education can be a tool to achieve a balance between human needs and environmental conservation.

3) MWU60201 Special Purpose English
Prerequisite courses: -

This course covers four skills in English, namely listening, reading, speaking, and writing. This course includes the rules of English grammar, communicating in mathematics orally, communicating in mathematics in writing, listening to mathematics videos, presenting mathematics videos, translating mathematics texts from English to Indonesian and vice versa, and rewriting mathematics articles. In addition, students also get the knowledge and practice of TOEFL exercises.

3. Faculty Subject Group (MKF)

1) FMI60201 Natural Sciences Insight and Study
Prerequisite courses: -

This course discusses the basic methods of mathematics (scientific methods) in solving problems and the methods/techniques for drawing conclusions based on correct reasoning (mathematical logic). It also covers basic scientific concepts and current developments.

2) FMI60202 Basic Statistics
Prerequisite courses: -

This course contains discussions about basic statistical concepts which include: (1) the definition and differences between population and sample, parameters and statistics, descriptive and inferential statistics, parametric and nonparametric statistics, and measurement scales; (2) measures of central tendency (mean, median, and mode); (3) measures of position (median, quartile, decile, and percentile); (4) measures of distribution (range, standard deviation, and variance); (5) data presentation (tables and diagrams); (6) random variables (discrete and continuous); (7) sampling distribution (distribution of the mean and standard deviation); (8) parameter estimation (mean of 1 population); and (9) hypothesis testing (mean of one population).

4. Group of Scientific Foundation Study Subjects

COMPULSORY COURSES
1) SPM60301 Algebra and Trigonometry
Prerequisite courses: -

This course contains a discussion of the meaning of angles and the quantities used in measuring them, the definition of trigonometric functions and their extensions for non-single angles, various equations and inequalities of trigonometric functions, various graphs of simple trigonometric functions, graphs of addition and multiplication of two simple trigonometric functions and being able to apply them to problems in everyday life.

2) SPM60302 Differential Calculus

Prerequisite courses: -

This course contains a discussion of the meaning of angles and the quantities used in measuring them, the definition of trigonometric functions and their extensions for non-single angles, various equations and inequalities of trigonometric functions, various graphs of simple trigonometric functions, graphs of addition and multiplication of two simple trigonometric functions and being able to apply them to problems in everyday life.

3) SPM60303 Logic and Sets
Prerequisite courses: -

This course contains discussions about statements, truth tables, tautologies, contradictions, contradictions, contingencies, arguments, set definitions, set operations, relations, equivalence, functions, and the number of set members.

4) SPM60304 Basic Statistics Lab
Prerequisite courses: -

This practicum supports the understanding of Basic Statistics concepts through the application of data analysis using Microsoft Excel and SPSS. Students will practice data input and processing, table and diagram creation, calculation of measures of central tendency, location, and dispersion, as well as sampling distribution simulations, parameter estimation, and simple hypothesis testing. The practicum is designed as a project-based approach to connect theory to real-world contexts and enhance statistical data analysis skills.

5) SPM60305 Linear Algebra
Prerequisite courses: -

This course covers basic and advanced concepts in Linear Algebra, including systems of linear equations, Gauss and Gauss-Jordan elimination methods, matrices and their operations, determinants, vector spaces and subspaces, basis and dimension, and linear transformations. Eigenvalues and vectors, diagonalization, and canonical forms of matrices are also discussed. This course is designed to provide students with a strong conceptual understanding and analytical skills, as an important foundation for the study of mathematics and its applications in other fields, including statistics, cryptography, and modeling.

6) SPM60206 Plane Geometry
Prerequisite courses: -

This course covers discussions on the understanding of basic elements in geometry, angles, parallelism, triangles, quadrilaterals, congruence, area and perimeter of plane figures, similarity, Pythagoras' theorem, circles, and regular polygons in a deductive axiomatic manner.

7) SPM60307 Integral Calculus

Prerequisite courses: SPM60302

This course covers basic and advanced concepts in integral calculus. The material covers indefinite integrals, integration techniques (substitution, partials, partial fractions, etc.), definite integrals, and their applications in calculating area, volume of solids, curve length, and surface area. It also examines improper integrals, as well as an introduction to double and triple integrals.

8) SPM60208 Psychology of Learning Mathematics
Prerequisite courses: -

This course discusses psychological aspects that influence the process of learning mathematics, including the formation of mathematical concepts, cognitive psychology (memory structure and function, cognitive load theory), intelligence (including multiple intelligences), motivation, math anxiety, belief, interpersonal factors, learning theories, and strategies for diagnosing and dealing with mathematics learning difficulties appropriately.

9) SPM60309 Advanced Statistics
Prerequisite courses: FMI600202

This course contains theoretical and practical discussions (using specific software) on hypothesis testing (average of two populations, proportion of one and two populations, variance of one and two populations, and normality tests), analysis of variance (one-factor and two-factor ANOVA), correlation and linear regression (simple and multiple), and non-parametric statistics.

10) SPM60210 Computer Applications
Prerequisite courses: -

This course covers the application of various computer applications to solve mathematical problems effectively and efficiently. Students will be introduced to various software and digital tools used in the analysis, visualization, and solution of mathematical problems.

11) SPM60211 Geometry of Space
Prerequisite courses: SPM60205

This course contains discussions about the elements of space and their relations, perpendicularity, angles, distance, prisms, pyramids, cylinders, cones, spheres, and regular polygons.

12) SPM60312 Advanced Calculus
Prerequisite courses: SPM60307

This course covers advanced integration techniques, improper integrals, sequences and series, and an introduction to restricted multivariable calculus, such as functions of two variables, partial derivatives, and double integrals. The material is designed to support an understanding of advanced mathematics, particularly in its application to Probability Theory.

13) SPM60213   Creativity, Innovation, and Entrepreneurship
Prerequisite courses: -

This course covers the basic concepts of creativity, the innovation process, entrepreneurial characteristics and mindset, business opportunity identification, business model development, and strategies for starting and managing a business. Students are also encouraged to develop business ideas based on local potential and technology, as well as develop a business plan.

14) SPM60314   Differential Equations
Prerequisite courses: SPM60302

This course contains discussions on the definition and solution of differential equations, solutions of the first derivative of an equation, grouping methods, integrals, separate equations, homogeneous equations, linear equations, Bernoulli equations, special transformations, homogeneous equations with constant coefficients, the method of indefinite coefficients, variation of parameters, and the Cauchy-Euler equation.

15) SPM60315   Linear Program
Prerequisite courses: SPM60305

This course covers discussions on the formulation of Linear Program problems, solving Linear Program problems using graphical methods, integer programming, solving Linear Program problems using the simplex method, the simplex method for general constraints, the two-stage simplex method, duality, the theory of the simplex method, sensitivity analysis, special cases of Linear Program problems, and transportation problems.

16) SPM60216   Number Theory
Prerequisite courses: SPM60303

This course covers the properties of integers and the relationships between them. Topics covered include division and the Euclidean algorithm, prime numbers and factorization, the fundamental theorem of arithmetic, congruence, residue systems, and important theorems such as Euler's Theorem, Fermat's Little Theorem, and the Chinese Remainder Theorem. Basic applications in cryptography and programming are also covered.

17) SPM60217   Algorithms and Programming
Prerequisite courses: =

This course covers the properties of integers and the relationships between them. Topics covered include division and the Euclidean algorithm, prime numbers and factorization, the fundamental theorem of arithmetic, congruence, residue systems, and important theorems such as Euler's Theorem, Fermat's Little Theorem, and the Chinese Remainder Theorem. Basic applications in cryptography and programming are also covered.

18) SPM60218   Analytical Geometry of Plane
Prerequisite courses: SPM60206

This course covers discussions about geometric objects in two dimensions using algebraic language which includes coordinate systems, lines, circles and conic sections.

19) SPM60219   Innovation in Manipulative Mathematics Learning Media
Prerequisite courses: -

This course discusses the concept of practical and effective mathematics learning media. The development of learning media is based on the needs of today's students. Furthermore, the development of learning media is intended to help teachers instill concepts in students and avoid common misconceptions. In this course, students practice designing various manipulative teaching aids, which are used in junior high school learning, such as media for teaching transformations, media for understanding the concept of integer operations, and media for proving the Pythagorean theorem.

20) SPM60220   Middle School Mathematics Study 1
Prerequisite courses: -

This course covers mathematics topics taught at the junior high and early senior high school levels, with an emphasis on understanding concepts, structures, and pedagogical approaches appropriate for high school students. Topics include numbers, algebra, basic geometry, relations and functions, and an introduction to trigonometry and basic statistics. The course not only examines the content but also examines common misconceptions among students and how to develop effective, engaging, and meaningful learning strategies.

21) SPM60221   Mathematics Curriculum and Learning
Prerequisite courses: -

This course covers the concepts, types, and models of curriculum development; curriculum components consisting of graduate competency standards, content standards, process standards, and assessment standards; the history of curriculum development in Indonesia; educational level curriculum; and mathematics learning tools.

22) SPM60222   Mathematics Learning Model
Prerequisite courses: -

This course covers various approaches, strategies, methods, and learning models relevant to mathematics education. The materials cover learning models such as Expository, Discovery Learning, Inquiry Learning, Contextual Teaching and Learning (CTL), Realistic Mathematics Education (RME), Problem-Based Learning (PBL), Project-Based Learning (PjBL), Open-Ended Approach, Scientific, Brain-Based Learning (BBL), STEM (Science, Technology, Engineering, and Mathematics), Cooperative Learning, and Collaborative Learning. Students will also learn the principles of effective learning design, techniques for engaging students through questions and answers, discussions, and assignments (homework).

23) SPM60223   Introduction to Abstract Algebra
Prerequisite courses: -

This course covers the basic concepts and properties of abstract algebraic structures that serve as the foundation for developing an understanding of advanced mathematics, along with examples of their applications. The material covers binary operations, groups and subgroups, cyclic groups, permutation groups, group homomorphisms and isomorphisms, rings, subrings, and ideals.

24) SPM60324   Probability Theory
Prerequisite courses: SPM60312

This course contains a discussion of the basic concepts of probability theory which include sample spaces and events, counting principles (rules of addition and multiplication, permutations, and combinations), probability rules, conditional probability, independence, Bayes' theorem, discrete and continuous random variables, probability functions, dense functions/probability densities, expected values, variances, and moments, as well as calculating probability values for various distributions, such as Binomial, Poisson, Geometric, Hypergeometric, Normal, Student's t, Chi-square, and F. In addition, the joint distribution of discrete & continuous random variables, independence, conditional distribution, properties of random variables, covariance, correlation and joint moment generating functions are also studied. The material is linked to real-life contexts and mathematics learning.

25) SPM60225   Real Analysis
Prerequisite courses: -

This course covers the algebraic structure, order, and completeness properties of the real number system. It also covers absolute value and its properties, Cauchy sequences, the concept of limits, and continuity of functions as the basis for mathematical analysis. Students are trained to develop logical thinking skills, prove fundamental theorems, and relate these concepts to the needs of mathematics learning in schools.

26) SPM60226   Philosophy of Mathematics Education
Prerequisite courses: -

This course covers the nature, methods, and values of mathematics and mathematics education. The philosophy of mathematics covers the history of mathematics, the foundations of mathematics, mathematical concepts, mathematical objects, mathematical methods, the development of mathematics, the hierarchy of mathematics, and the values of mathematics. The philosophy of mathematics education covers the ideology and foundations of mathematics education, as well as the nature, methods, and values of education, curriculum, educators, students, teaching objectives, teaching methods, teaching facilities, and teaching assessment.

27) SPM60227   Analytical Geometry of Space
Prerequisite courses: SPM60211

This course contains discussions about geometric objects in three dimensions, including Coordinate Systems in Space, Planes, Lines, Spheres and Conicoids, which are discussed using algebraic language.

28) SPM60228   Middle School Mathematics Study 2
Prerequisite courses: -

This course covers advanced mathematics topics at the senior high school level, with a focus on conceptual, structural, and pedagogical studies. Key topics include exponential and logarithmic functions, advanced trigonometry, limits and derivatives, basic integrals, matrices and vectors, sequences and series, and probability and statistics. Students will analyze the characteristics of the material, potential learning difficulties, and appropriate learning approaches.

29) SPM60229   Discrete Mathematics
Prerequisite courses: SPM60303

This course covers Boolean algebra, combinatorics, recurrence relations, generating functions, and an introduction to graph theory. Its primary focus is the development of logical and analytical thinking and the application of these concepts in the context of computer science, engineering, and mathematics education.

30) SPM60230   Interactive Mathematics Learning Media
Prerequisite courses: -

This course discusses the development of interactive learning media for use in mathematics education. Topics covered include interactive learning theory, digital media design principles, and technology integration in mathematics teaching and learning. Students will be introduced to various digital tools and platforms that support interactivity, such as animation software, simulations, and mobile learning applications, to create dynamic and engaging learning experiences and enhance student engagement and understanding through interactive media.

31) SPM60231   Numerical Methods
Prerequisite courses: -

This course covers errors in numerical approximations; numerical solutions of systems of linear equations; numerical approximations of the roots of nonlinear equations; numerical interpolation, differentiation, and integration; and numerical solutions of ordinary differential equations (initial value problems).

32) SPM60232   Mathematics Learning Assessment
Prerequisite courses: -

This course covers the basic concepts of educational assessment; government policies related to assessment; the validity and reliability of instruments; the forms of test and non-test instruments; the planning, preparation, and development of test and non-test instruments for mathematics learning; and the analysis of test instrument items, alternative tests, and non-tests, both theoretically and empirically (manually and using computer programs).

33) SPM60333   Mathematics Learning Planning

Prerequisite courses: -

This course discusses the philosophical foundations of mathematics education, including views on the nature of mathematics, the nature of learning and teaching mathematics, and the goals of mathematics education in social and cultural contexts. The study covers philosophical schools of thought such as realism, constructivism, logicism, formalism, and intuitionism, as well as their influence on the curriculum, learning strategies, and assessment in mathematics education.

34) SPM60234   History of Mathematics

Prerequisite courses: -

This course covers the Numeration System; Babylonian and Egyptian Mathematics; Euclid and His Works (The Elements); Pythagoras and Descartes; Greek Mathematics; Chinese Mathematics; Indian Mathematics; Islamic Mathematics; Medieval European Mathematics; History of Algebra; Development of Non-Euclidean Geometry; Development of Calculus; and Development of Statistics and Probability Theory.

35) SPM60235   Transformation Geometry

Prerequisite courses: -

This course contains a discussion of geometry based on transformation groups which include isometry (identity transformation, translation, reflection, rotation, and shear reflection) and similarity (dilation, dilative reflection, and dilative rotation) synthetically, analytically, and using a matrix approach.

36) SPM60236   Microlearning

Prerequisite courses: -

This course covers basic teaching skills, development of lesson plans, and limited and integrated learning practices.

ELECTIVE COURSES

1) SPM60337 English Mathematics

Prerequisite courses: -

This course covers mathematical terms in English; skills in opening learning activities, explaining material, managing the learning process, and closing learning activities using English; and reviewing English-language mathematics books and mathematics articles published in reputable international journals.

2) SPM60338 Mathematical Thinking Study

Prerequisite courses: -

This course discusses the characteristics and forms of mathematical thinking that are important in the learning process and development of students' mathematical competence.

The study includes types of mathematical thinking such as logical, critical, creative, reflective, analytical, and intuitive thinking, as well as higher-order thinking skills (HOTS) in the context of mathematical problem solving. Students will study theories and research results related to mathematical thinking processes, indicators and ways to develop and measure students' mathematical thinking skills, and design learning activities that encourage these thinking skills. This course also examines the relationship between mathematical thinking and mathematical dispositions, metacognition, and 21st-century skills.

3) SPM60239 International Mathematics Education Study
Prerequisite courses: -

This course contains a discussion of the results of international surveys related to students' mathematical abilities such as TIMMS and PISA in various countries as well as education systems, learning curricula, learning strategies, and learning evaluation systems from various countries that are advanced in the field of mathematics education.

4) SPM60340 AI-based Learning Media
Prerequisite courses: -

This course covers the fundamentals of artificial intelligence (AI) and its application in developing interactive and adaptive mathematics learning media. Students will be introduced to AI principles, simple algorithms, and supporting tools such as ChatGPT, an image generation platform, and AI-based editing software that can be used to create various types of learning media, such as interactive videos, educational chatbots, and mathematical simulation applications.

5) SPM60241 Ethnomathematics
Prerequisite courses: -

This course covers the relationship between mathematics and culture; how mathematical concepts are discovered and applied in various communities; a study of ethnomathematics theory and research findings; identification of ethnomathematics resources in the surrounding environment; development of ethnomathematics-based mathematics learning tools; and development of ethnomathematics-based mathematics learning models.

6) SPM60342 Selected Chapters on Mathematics Education
Prerequisite courses: -

This course discusses selected topics in mathematics education, including contemporary issues, learning innovations, and the latest research results, as well as the latest mathematical content that is relevant to scientific developments and needs in schools and the real world to encourage critical and reflective thinking skills in responding to the challenges of mathematics education scientifically.

7) SPM60243 STEM Learning Approach
Prerequisite courses: -

This course contains a discussion of the basic concepts, principles, and implementation of the STEM (Science, Technology, Engineering, and Mathematics) learning approach in an educational context that focuses on cross-disciplinary integration and the development of critical, creative, and problem-solving thinking skills through an innovative and interactive learning approach.

8) SPM60244 Qualitative Research on Mathematics Education
Prerequisite courses: -

This course covers qualitative research approaches, methods, and techniques in the context of mathematics education. The main focus includes understanding qualitative paradigms, formulating research problems, developing research designs, data collection techniques (observation, interviews, and documentation), qualitative data analysis, and writing research reports. Students are also encouraged to examine various qualitative studies in mathematics education and develop their skills in conducting small-scale research independently.

9) SPM60245 Geometry System
Prerequisite courses: -

This course covers the discussion of Geometry viewed as a deductive system, consisting of Ordered Geometry, Affine Geometry, Absolute (Neutral) Geometry, Hyperbolic Geometry, Elliptic Geometry, which is compared with Euclidean Geometry.

10) SPM60246   Graph Theory
Prerequisite courses: -
This course covers the basic concepts of graphs, types of graphs, graph representations, paths and circuits, tree graphs, and graph coloring. Students will learn to analyze and apply graph theory to solve mathematical and contextual problems, and explore its potential in mathematics learning in schools.

11) SPM60247   Development of Mathematics Learning Videos
Prerequisite courses: -

This course covers the concepts, techniques, and applications of video as an effective and engaging medium for mathematics learning. Students will explore various types of instructional videos, such as live recordings, tutorial videos, animated videos, interactive videos, and will be introduced to various modern video editing software.

5. Scientific Development Course (MKPK)

1) MKK60301   Research methodology
Prerequisite courses: -

This course is designed to provide an in-depth understanding of the basic principles of scientific research. Students will learn the process of developing a theoretical framework,

formulating a research problem, and selecting an appropriate methodological approach. Furthermore, this course covers techniques for data collection, data analysis, and interpretation of research results. Students will also be taught how to prepare a systematic research report in accordance with academic principles. Through this course, students are expected to be able to apply research methodology to solve problems scientifically and contribute to the development of knowledge in their fields.

2) MKK60801   Thesis
Prerequisite courses: -

The Final Project course is a compulsory course designed to develop students' ability to conduct independent research in mathematics education. Students are required to design, implement, and compile a research report in the form of a thesis that meets scientific principles and academic ethics.