2022 MERDEKA CURRICULLUM

MATHEMATICS EDUCATION STUDY PROGRAM

FACULTY OF MATHEMATICS AND NATURAL SCIENCES
UNIVERSITAS NEGERI YOGYAKARTA

FOREWORD

The 2022 Merdeka Curriculum of the Mathematics Education Study Program, FMIPA UNY was prepared in UNY's efforts to follow up on the Merdeka Curriculum policy launched by the Minister of Education and Culture in 2022. The curriculum preparation takes into account Presidential Regulation No. 8 of 2012 concerning the Indonesian National Qualifications Framework (KKNI), Regulation of the Minister of Education and Culture No. 3 of 2022 concerning National Standards for Higher Education, Rector Regulation No. 5 of 2022 concerning the Merdeka Curriculum for Undergraduate and Applied Undergraduate Programs at Yogyakarta State University, and Rector Regulation No. 7 of 2022 concerning Guidelines for the Implementation of the Merdeka Curriculum for Undergraduate and Applied Undergraduate Programs at Yogyakarta State University.

The 2022 MBKM curriculum accommodates students to have the opportunity for 1 (one) semester or equivalent to 20 (twenty) credits to study outside the study program at the same university; and a maximum of 2 (two) semesters or equivalent to 40 (forty) credits to study in the same study program at a different university, study in a different study program at a different university; and/or study outside the university. Based on this policy, the curriculum provides 3 alternative study period patterns, namely 5-1-2, 6-1-1, and 6-0-2. These three numbers respectively indicate the number of semesters students study in their own study program, the number of semesters students have the opportunity to study in other study programs at the same university, and the number of semesters students have the opportunity to study in other study programs at different universities.

The 2022 MBKM Curriculum for the Mathematics Education Study Program, Faculty of Mathematics and Natural Sciences, contains the vision, mission, objectives, graduate competencies, graduate profiles, a list of compulsory and elective courses, the distribution of courses each semester according to the three study period patterns, and course descriptions.

We hope that this curriculum will contribute significantly to producing quality graduates at the national and international levels, as well as facilitating the implementation of education.

Yogyakarta, August 30, 2022
Curriculum Development Team
Department of Mathematics Education
FMIPA, UNY

LIST OF CONTENTS

STUDY PROGRAM IDENTITY

Name of Study Program	:Mathematics Education
Name of Management Unit	:Faculty of Mathematics and Natural Sciences
Name of College	: YOGYAKARTA STATE UNIVERSITY
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INTRODUCTION

A. Background

Curriculum change is a natural process and should indeed occur. Advances in science and technology, societal needs, technological advancements, and new government policies require curriculum change. Life in the 21st century demands fundamental changes in the higher education system. The rapid changes in information and communication technology and the emergence of the era of disruption have also led to the emergence ofRapid changes in the economic, social, and cultural sectors are occurring. In these highly dynamic times, a transformation in learning is needed to equip and prepare higher education graduates to become a superior generation.

The demands of 21st century competencies place creativity and innovation as important keywords to equip graduates.educationHigh standards are essential for optimal contribution to Indonesia's development. The government, through the Minister of Education and Culture, launched the Merdeka Curriculum Policy in 2022. This policy is intended to serve as a framework for preparing students to become resilient graduates, relevant to the needs of the times, and ready to become leaders with a strong national spirit. Therefore, universities must prepare a set of plans and regulations regarding objectives, content, and learning materials, as well as the methods used as guidelines for implementing learning activities to achieve these objectives. This set of tools is hereinafter referred to as the 2022 Merdeka Curriculum Curriculum (MBKM). This curriculum aims to encourage students to master various knowledge areas useful for entering the workforce.

The Merdeka Curriculum policy complies with Minister of Education and Culture Regulation Number 3 of 2022 concerning National Standards for Higher Education. Article 18 states that undergraduate or applied undergraduate students can fulfill their study period and load requirements by: 1) participating in all learning processes within their study program at the university according to the study period and load requirements; and 2) participating in learning processes within their study program to fulfill part of their study period and load requirements, while the remainder can be done outside of their study program.

Through Merdeka Belajar – Kampus Merdeka, students have the opportunity for 1 (one) semester or the equivalent of 20 (twenty) credits to study outside the study program at the same Higher Education Institution; and a maximum of 2 (two) semesters or the equivalent of 40 (forty) credits to study in the same study program at a different

Higher Education Institution, study in a different study program at a different Higher Education Institution; and/or study outside the Higher Education Institution.

Minister of Education and Culture Regulation No. 3 of 2022 grants students the right to study outside their program for three semesters. This program provides ample opportunities for students to enrich and enhance their knowledge and competencies in the real world. Learning can occur anywhere, not only in classrooms, libraries, and laboratories, but also in villages, industries, workplaces, community service centers, research centers, and the community.

The MBKM Curriculum development policy must remain guided by the previous government policy, namely Presidential Regulation of the Republic of Indonesia Number 8 of 2012 concerning the Indonesian National Qualifications Framework (KKNI). KKNI is a competency qualification framework that can juxtapose, equalize, and integrate the fields of education and job training as well as work experience in order to provide recognition of work competencies according to the job structure in various sectors. The KKNI, which consists of nine levels, has implications for the higher education curriculum. Graduates of D-3 level study programs must achieve KKNI level 5, S-1 level level 6; professional programs level 7; S-2 level level 8, and S-3 level level 9.

In addition to referring to the KKNI (National Qualifications Framework), higher education curricula are also outcome-based. Higher education outcomes, as indicated by Graduate Learning Outcomes, represent a person's competency to perform a set of intelligent, responsible actions as a prerequisite for being considered capable by society in carrying out tasks in a specific field of work. Learning outcomes are abilities acquired through the internalization of knowledge, attitudes, skills, competencies, and accumulated work experience (Presidential Decree No. 8, 2012). Assessment of higher education outcomes is carried out not only by universities but also by community stakeholders.

UNY has a vision, mission, and goals that need to be actualized in the study program curriculum. The vision, in 2025 UNY to become a world-class educational university based on piety, independence and scholarship, which is superior, creative, innovative. In accordance with the vision of UNY, the Faculty of Mathematics and Natural Sciences (FMIPA) has set a vision "to become a faculty of superior quality, in a scientific, critical, creative and innovative attitude in the Southeast Asian region based on piety, independence, and scholarship in 2025". The vision of UNY and the vision of the faculty are the basis for determining the vision of the Study Program.

Innovative curriculum development must be a shared commitment within higher education management. Yogyakarta State University then formulated a UNY Rector's policy in the form of Rector's Regulation Number 5 of 2022 concerning the

Independent Learning-Independent Campus Curriculum for the Undergraduate and Applied Undergraduate Programs of Yogyakarta State University. This is intended to achieve UNY's vision, both in implementing learning activities to produce teaching and non-teaching personnel. Therefore, UNY designed a curriculum that supports learning activities in accordance with national policies.

Curriculum development is a complex, multidimensional, and multilevel process, starting with the existing curriculum. Curriculum improvements need to be based on past, present, and future analyses of various dimensions of life. Likewise, a SWOT analysis of the existing curriculum and the results of a tracer study on graduate performance are needed. Furthermore, study programs need to re-establish graduate profiles, learning outcomes, courses and their weights, curriculum and semester program structures, learning standards, and assessments. Curriculum improvements need to be carried out systematically and comprehensively to encompass university programs, faculties, departments, and study programs. To ensure a uniform curriculum development pattern across all study programs, the Faculty of Mathematics and Natural Sciences coordinates the development of study program curricula. Furthermore, each study program in the Mathematics Education Department develops its curriculum by following the stages outlined in the UNY MBKM Curriculum Implementation Guide.

B. Legal Foundation

1. Legal Basis

a. Law Number 20 of 2003 concerning the National Education System
b. Law Number 14 of 2005 concerning Teachers and Lecturers
c. Law Number 12 of 2012 concerning Higher Education
d. Presidential Regulation of the Republic of Indonesia Number 8 of 2012 concerning the Indonesian National Qualifications Framework (KKNI)
e. Government Regulation Number 19 of 2005 concerning National Education Standards
f. Government Regulation Number 74 of 2008 concerning Teachers
g. Government Regulation Number 17 of 2010 concerning the Management and Implementation of Education
h. Regulation of the Minister of National Education Number 16 of 2007 concerning Academic Qualification Standards and Teacher Competencies

i. Regulation of the Minister of National Education Number 27 of 2008 concerning Academic Qualification Standards and Counselor Competencies
j. Regulation of the Minister of State for Empowerment of State Apparatus and Bureaucratic Reform Number 16 of 2009 concerning Teacher Functional Positions and their Credit Points
k. Regulation of the Minister of Research, Technology and Higher Education Number 44 of 2015 concerning National Standards for Higher Education (SNPT)
l. Regulation of the Minister of Research, Technology and Higher Education Number 35 of 2017 concerning the UNY Statutes
m. Regulation of the Minister of Research, Technology and Higher Education Number 55 of 2017 concerning Teacher Education Standards
n. Circular Letter of the Directorate General of Higher Education Number 255/B/SE/VIII/2016 concerning Guidelines for the Preparation of Higher Education Curriculum
o. UNY Chancellor Regulation Number 1 of 2019 concerning UNY Academic Regulations
p. Yogyakarta State University Study Program Curriculum Development Guidelines for 2019.
q. Regulation of the Minister of Education and Culture Number 3 of 2022 concerning National Standards for Higher Education
r. UNY Chancellor Regulation No. 5 of 2022 concerning the Independent Learning-Independent Campus Curriculum for Undergraduate and Applied Undergraduate Programs at Yogyakarta State University
s. UNY Chancellor Regulation No. 7 of 2022 concerning Guidelines for Implementing the Independent Learning-Independent Campus Curriculum for Undergraduate and Applied Undergraduate Programs at Yogyakarta State University
t. Dean's Decree No. B/93.1/UN.34.13/HK.03/2022 concerning the Curriculum of the Faculty of Mathematics and Natural Sciences

2. Philosophical Basis

The development of the UNY Mathematics Study Program curriculum is based on various philosophies such as humanism, essentialism, perennialism, idealism, and social reconstructionism with the following thoughts.

a. Indonesian people, as God's creatures, possess a good divine nature; they are able to learn and practice to acquire knowledge and skills, and develop an intelligent, intellectual, and independent attitude.

b. Education builds a complete Indonesian human being who is Pancasilaist; devout to God Almighty, humane, dignified, just, democratic, and upholds social values.
c. Education equips students with progressive knowledge, skills, and attitudes so they can exist and succeed in their lives.
d. Education takes into account the characteristics and needs of students, the needs of society, the progress of science and technology, and the cultural heritage of the Indonesian nation.
e. Educators have professional competencies that include personality, social, pedagogical, and expertise competencies that are in accordance with their scientific fields and work professionally with the principles of ibadah, ing ngarso sung tuladha, ing madya mangun karsa, and tut wuri handayani.
f. Educational institutions are an independent, authoritative, dignified and responsible system for enlightening the nation's life.

3. Theoretical Basis

The development of the UNY Mathematics Study Program curriculum is based on the following science and principles of curriculum development.

a. Relevance; curriculum and learning must be relevant to developments in science and technology, societal needs, and current developments.
b. Continuity; the undergraduate, postgraduate, and doctoral curriculum must be continuous, with clear links and levels.
c. Flexibility; the curriculum should have horizontal and vertical flexibility in terms of both content and implementation process.
d. Effectiveness and efficiency; the curriculum is designed to be effective and efficient in its implementation to achieve the established learning outcomes. For example, a bachelor's degree must be completed within four years.
e. Pragmatic; the curriculum that has been prepared should be able to be implemented well according to the various conditions that exist in the study program.

C. Curriculum Development Process

The objectives of developing the MBKM curriculum for the UNY Mathematics Study Program are as follows.

1. Improving the curriculum in accordance with the KKNI generic competencies.
2. Determine graduate qualifications in each study program.
3. Compile Learning Outcomes in accordance with the generic description of KKNI in each study program.
4. Developing a study program curriculum structure that includes university courses, faculties, and study programs, in accordance with the study period pattern determined in UNY Chancellor Regulation No. 5 of 2022 concerning the Independent Learning-Independent Campus Curriculum for Undergraduate and Applied Undergraduate Programs at Yogyakarta State University.
5. Improve the learning system, learning facilities and infrastructure, and assessment in accordance with the new curriculum that has been prepared.

The development of the MBKM curriculum for the UNY Mathematics Study Program is based on the following science and principles of curriculum development.

1. Curriculum changes are seen as something that must happen due to changes in science, technology, art and culture in society.
2. Curriculum development is based on the previous curriculum through a process of self-evaluation, tracer study, and in-depth futuristic studies.
3. Curriculum development is teamwork, not individual work, involving lecturers, students, stakeholders, and other related elements.
4. The development of the MBKM study program curriculum is based on the Indonesian National Qualifications Framework, abbreviated as KKNI, which is a competency qualification grading framework that can match, equalize, and integrate the fields of education and work training as well as work experience in order to provide recognition of work competencies in accordance with the job structure in various sectors.
5. Development of undergraduate curriculum (bachelor's degree) equivalent to KKNI level 6.

D. Development Procedures

The curriculum development procedure for the MBKM Mathematics Study Program is compiled by referring to Rector's Regulation No. 7 of 2022 concerning the Guidelines for Implementing the Independent Learning-Independent Campus Curriculum for Undergraduate and Applied Undergraduate Programs at Yogyakarta State University. The curriculum development procedure includes the following steps: 1) Determining Graduate Profiles; 2) Formulating Main and Additional Learning

Outcomes; 3) Reviewing Competency Elements; 4) Determining Study Materials; 5) Establishing Courses; 6) Determining Credit Weights; 7) Developing Semester Programs according to the study period patterns of 512, 611, and 602; 8) Determining Learning Activities; 9) Determining Assessment/Evaluation Systems.
The nine stages can be seen in Figure 1.

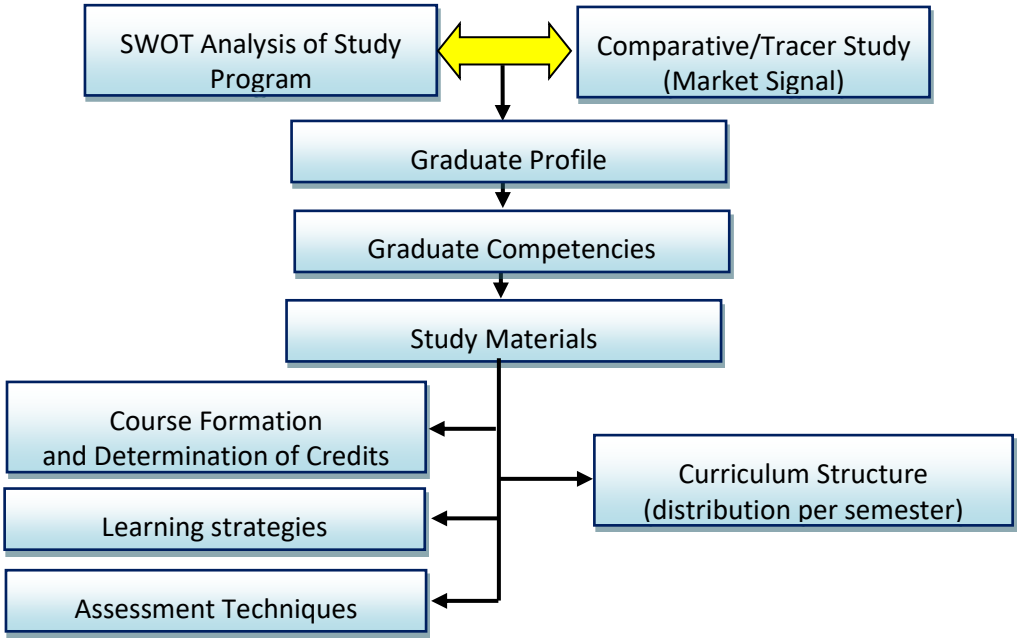


Figure 1. Stages of Curriculum Development

CURRICULUM OF THE BACHELOR'S STUDY PROGRAM IN MATHEMATICS EDUCATION

A. Scientific Vision of the Study Program

Scientific Vision of the Mathematics Education Study Program

To become a superior and innovative study program in producing creative, adaptive, and globally-minded mathematics educators, as well as those who master mathematical content, pedagogy-didactics, learner development psychology, authentic assessment, and learning technology to create quality education.

B. Mission of the Mathematics Education Study Program

1. Organizing superior, creative, and innovative education to produce mathematics educators who master mathematics content, pedagogy-didactics, psychology of learner development, authentic assessment, and mathematics learning technology, as well as having adaptive abilities and global insight to support quality education in the modern era.
2. Conducting in-depth, innovative research in the field of mathematics education based on pedagogical-didactic studies, developmental psychology of learners, authentic assessment, and mathematics learning technology, to provide real contributions to the needs of the global community and the development of quality education.
3. Carrying out community service oriented towards the application of mathematical didactic science through the development of developmental psychology-based learning strategies, the implementation of authentic assessments, 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.
4. 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 learning psychology, authentic assessment, and mathematics learning technology.

C. Objective

1) **Producing mathematics educators**who are superior, creative, adaptive, and have a global perspective, who master mathematical content, pedagogy-didactics, psychology of learner development, authentic assessment, and learning technology to support quality education in the modern era.
2) **Producing research**innovative and in-depth in the field of mathematics education based on pedagogy-didactics, psychology of learner development, authentic assessment, and learning technology, which makes a real contribution to the development of education at the national and global levels.
3) **Produce community service programs**which is oriented towards the application of mathematical didactic science through developmental psychology-based learning strategies, implementation of authentic assessments, and utilization of educational technology, in order to improve the quality of mathematics learning and empower the educational community.
4) **Produce study program governance**which is good, transparent, and accountable, which supports the development of mathematical didactic science based on learning psychology, authentic assessment, and learning technology, through strategic collaboration with various parties at the national and international levels.

D. Graduate Profile

The following is a profile of graduates of the Mathematics Education Study Program, FMIPA UNY.

Table 1. Profile of Graduates of the Mathematics Education Study Program

No	Profile Name	Description
1	Mathematics Educator	Graduates of the mathematics education study program can become professional educators in the field of mathematics in formal and non-formal institutions.
2	Developer of Mathematics Learning Resources and Media	Graduates of the mathematics education study program can become developers of printed and digital learning resources as well as conventional and digital learning media.
3	Education Manager	Graduates of the mathematics education study program can become managers of formal and non-formal educational institutions.

E. Study Program Features

The Mathematics Education study program has several characteristics, namely:

1. **Multidimensional Scientific Integration**

   The Mathematics Education study program at the Faculty of Mathematics and Natural Sciences, Yogyakarta State University (FMIPA), combines three main pillars of mathematics education: strong mathematical concepts, mastery of modern pedagogy and didactics, and an understanding of the psychology of learner development. This enables graduates to teach with a holistic approach that is relevant to students' needs.

2. **Religiosity as a Core Value**

   Graduates are equipped with a strong religious character so that they have integrity, ethics, and moral responsibility in their profession, both as educators and education managers.

3. **Emphasis on Technology and Innovation**

   The Mathematics Education study program at FMIPA UNY focuses on mastering modern educational technology and the ability to create innovative digital-based learning media, making graduates excel in the era of technology-based learning.

4. **Global Insight and Adaptability**

   With a curriculum designed to prepare graduates to face global challenges, they have the ability to adapt to various educational contexts at both national and international levels.

F. Learning Outcomes of Graduates of the Mathematics Education Study Program

The Graduate Learning Outcomes (CPL) of the Mathematics Education Study Program consist of Main CPL and Additional CPL.

1. Main CPL

The main competencies or learning outcomes of graduates of the Mathematics Education Study Program include the following attitudes, knowledge, and skills.

Attitude

CPL 1. Demonstrate religious attitudes, humanitarian values, and academic norms

CPL 2. Demonstrate responsibility, adaptability, independence and leadership in carrying out tasks

General Skills

CPL 3. Demonstrate oral and written communication skills and collaboration skills

CPL 4. Able to utilize ICT effectively

Knowledge

CPL 5. Mastering the basic concepts of education, mathematical pedagogy-didactics, and educational research methodology

CPL 6. Comprehensively master various concepts of school mathematics and advanced mathematics

Special Skills

CPL 7. Applying basic educational concepts, pedagogical-didactic concepts, or school mathematics concepts or advanced mathematics in solving problems

CPL 8. Designing meaningful and implementable mathematics learning

CPL 9. Practicing mathematics learning based on appropriate pedagogical-didactic concepts

CPL 10. Developing innovative mathematics learning media and resources

CPL 11. Conducting holistic assessments of mathematics learning

CPL 12. Conducting research in the field of Mathematics Education

2. Additional CPL

There are 3 additional CPLs that cover aspects of attitude, knowledge and skills to enrich the competencies of Mathematics Education Study Program graduates, namely as follows.

1. Students have insight into mathematics learning
2. Students are able to apply data management skills in accordance with broader developments in information technology.
3. Students are able to develop creativity, independence and entrepreneurship.

G. The Relationship between Graduate Learning Outcomes and Mathematics Education Study Program Courses

Graduate Learning Outcomes (CPL) are important indicators in determining the competencies expected of graduates of a study program. CPL in the Mathematics Education Study Program is designed to ensure that graduates not only understand mathematical content but also apply it in effective, innovative, and ethical learning.

The link between CPL and the courses offered in the Mathematics Education Study Program is crucial to ensuring that each course contributes to the achievement of graduate competencies. By aligning the learning objectives of each course with CPL, the study program can provide an integrated and systematic learning experience, enabling graduates to develop pedagogical, professional, social, and personal competencies aligned with the needs of education and society.

The following are courses in the Mathematics Education Study Program that are designed and implemented to support the effective achievement of CPL.

No.	Course Name	Relation to CPL (marked √)											
		1	2	3	4	5	6	7	8	9	10	11	12
Semester 1													
1	Islamic education*	√	√	√	√								
2	Catholic Religious Education*	√	√	√	√								
3	Christian Religious Education*	√	√	√	√								
4	Hindu Religious Education*	√	√	√	√								
5	Buddhist Religious Education*	√	√	√	√								
6	Confucian Religious Education*	√	√	√	√								
7	Digital Transformation	√	√	√	√								
8	Statistics	√	√	√	√		√	√					
9	Educational Science	√	√	√	√	√							
10	Educational Psychology	√	√	√	√	√							
11	Algebra and Trigonometry	√	√	√	√	√	√	√	√	√			
12	Plane Geometry	√	√	√	√		√	√					
13	Logic and Sets	√	√	√	√		√	√					
14	Differential Calculus	√	√	√	√		√	√		√			
Semester 2													
1	Pancasila	√	√	√	√								
2	Indonesian	√	√	√	√								√
3	English	√	√	√	√		√	√					
4	Educational Management	√	√	√	√	√							
5	Sociology and Anthropology of Education	√	√	√	√	√							
6	Geometry of Space	√	√	√	√		√	√					

No.	Course Name	Relation to CPL (marked √)											
		1	2	3	4	5	6	7	8	9	10	11	12
7	Integral Calculus	√	√	√	√		√	√		√			
8	Elementary Linear Algebra	√	√	√	√		√	√			√		
9	Algorithms and Programming	√	√	√	√	√			√		√		
10	Data Analysis and Visualization	√	√	√	√		√	√			√		
Semester 3													
1	Civic education	√	√	√	√								
2	Social and Humanitarian Literacy	√	√	√	√								
3	Creativity, Innovation, and Entrepreneurship	√	√	√	√								
4	Psychology of Learning Mathematics	√	√	√	√	√		√					
5	English Mathematics Learning	√	√	√	√	√		√			√		
6	Analytical Geometry of Plane	√	√	√	√		√	√			√		
7	Computer Applications	√	√	√	√		√	√					
8	Differential Equations	√	√	√	√		√	√			√		
9	Linear Program	√	√	√	√		√	√			√		
10	Number Theory	√	√	√	√		√	√					
Semester 4													
1	Insight and Study of Mathematics and Natural Sciences	√	√	√	√								
2	Mathematics Curriculum and Learning	√	√	√	√	√		√	√				
3	Mathematics Learning Strategies	√	√	√	√	√			√				
4	Innovation in Manipulative Mathematics Learning Media	√	√	√	√		√	√			√		
5	Mathematics Learning Assessment	√	√	√	√	√						√	
6	Philosophy of Mathematics Education	√	√	√	√	√							
7	Middle School Mathematics Study 1	√	√	√	√		√	√	√				
8	Analytical Geometry of Space	√	√	√	√		√	√			√		
9	Discrete Mathematics	√	√	√	√		√	√					
10	Probability Theory	√	√	√	√		√	√					
Semester 5													
1	Mathematics Learning Planning	√	√	√	√		√	√	√			√	√
2	Interactive Mathematics Learning Media	√	√	√	√		√	√			√		

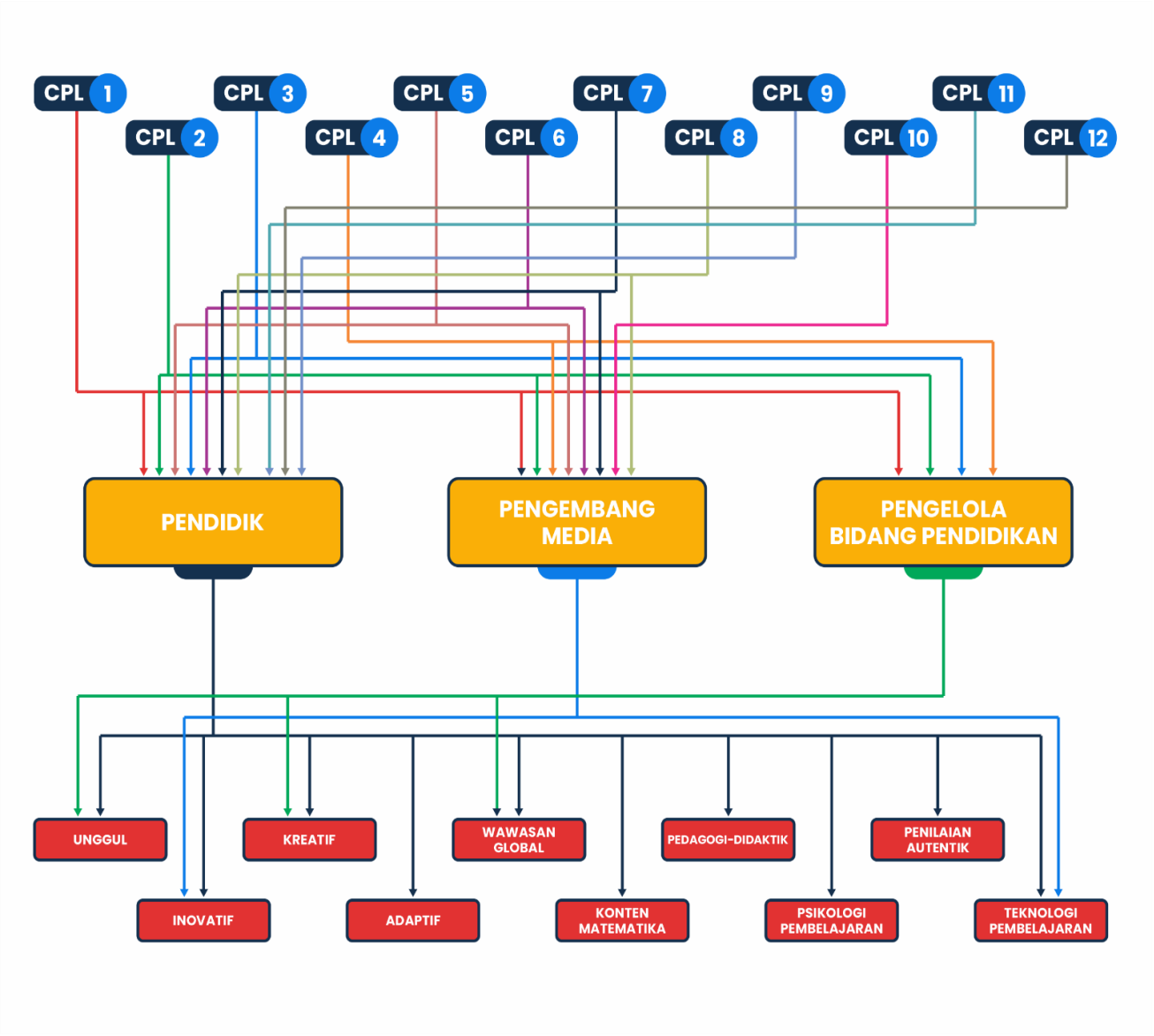
No.	Course Name	Relation to CPL (marked √)											
		1	2	3	4	5	6	7	8	9	10	11	12
3	Middle School Mathematics Study 2	√	√	√	√		√	√	√				
4	Transformation Geometry	√	√	√	√		√	√	√	√			
5	Numerical Methods	√	√	√	√		√	√					
6	English Mathematics	√	√	√	√		√	√					
7	International Mathematics Education Study	√	√	√	√		√	√					
8	Mathematics Learning for Gifted Students	√	√	√	√	√		√					
9	Selected Chapters on Mathematics Education	√	√	√	√		√	√					√
10	Virtual Mathematics Learning Media	√	√	√	√		√	√			√		
Semester 6													
1	Microlearning	√	√	√	√				√	√		√	
2	Mathematics Education Research Methodology	√	√	√	√	√							√
3	History of Mathematics	√	√	√	√		√	√	√				
4	Qualitative Research on Mathematics Education	√	√	√	√	√							√
5	STEM Learning Approach	√	√	√	√		√	√			√		
6	Ethnomathematics	√	√	√	√	√		√	√				
7	HOTS Mathematics Study	√	√	√	√		√	√	√				
8	Development of Mathematics Learning Videos	√	√	√	√		√	√			√		
Semester 7													
1	KKN	√	√	√	√								√
2	Educational Practice	√	√	√	√	√	√	√	√	√	√	√	√
Semester 8													
1	Final Thesis Assignment	√	√	√	√	√							√

H. The Relationship between Graduate Learning Outcomes and the Graduate Profile and Scientific Vision of the Mathematics Education Study Program

Graduate Learning Outcomes (CPL) are strategic guidelines for developing graduates with competencies aligned with the graduate profile and the study program's scientific vision. The profile of Mathematics Education graduates reflects their expected roles in education and society, such as becoming innovative educators, competent media developers, or reliable practitioners in the field of education.

Meanwhile, the scientific vision of the Mathematics Education Study Program serves as the primary direction in designing the CPL. This vision reflects the study program's commitment to developing superior, research-based mathematics education that is relevant to global challenges and local needs. Therefore, the CPL is designed to ensure that graduates not only meet the specified competency standards but also realize this scientific vision through their professional roles.

The following describes how CPL is structured and integrated with the graduate profile and scientific vision of the Mathematics Education Study Program, thus creating a strong synergy between learning objectives, graduate identity, and the strategic direction of the study program.



I. Curriculum Structure

1. Characteristics of the Mathematics Education Study Program Curriculum

The Independent Learning-Independent Campus curriculum for the Mathematics Education Study Program consists of 148-152 credits, offered in three study schedules: 5-1-2, 6-1-1, and 6-0-2. These three numbers, respectively, indicate the number of semesters a student studies in their own study program, the number of semesters a student has the opportunity to study in another study program within the same university, and the number of semesters a student has the opportunity to study in another study program at a different university.

This curriculum is structured into groups of courses as follows.

Table 6. Curriculum Structure Mathematics Education Study Program

No	Subject Group	Number of credits according to the study period pattern		
		5-1-2	6-1-1	6-0-2
1	Compulsory University Courses (MKU)	20	20	20
2	Elective University Courses (MKU)	2	2	2
3	Faculty Courses	4	4	4
4	Study Program Courses			
	a. Core Courses in Mathematics Education	86	86	86
	b. Elective Courses	20	20	20
5	Courses Outside the Study Program at UNY	8	8	8
6	UNY External Courses	12	12	12
	AMOUNT	**148-152**	**148-152**	**148-152**

The following describes the names of the courses and the credits for each course group.

a. Compulsory University Courses (MKU)

No	Course Code	Course Name	Credit details			Amount	Prerequisite	Semester	
			T	P	L			Odd	Even
	COMPULSORY UNIVERSITY COURSES								
1	MKU6201	Islamic education*	2			2		1	
	MKU6202	Catholic Religious Education*	2					1	
	MKU6203	Christian Religious Education*	2					1	
	MKU6204	Hindu Religious Education*	2					1	
	MKU6205	Buddhist Religious Education*	2					1	
	MKU6206	Confucian Religious Education*	2					1	
2	MKU6212	Digital Transformation	2			2		1	
3	MKU6208	Pancasila	2			2			2
4	MKU6209	Indonesian	2			2			2
5	MKU6211	English	2			2			2
6	MKU6207	Civic education	2			2		1	
7	MKU6213	Creativity, Innovation, and Entrepreneurship	2			2		3	
8	MKU6614	KKN			6	6		7	

No	Course Code	Course Name	Credit details			Amount	Prerequisite	Semester	
			T	P	L			Odd	Even
		Subtotal credits				20			
	SELECTED UNIVERSITY COURSES								
9	MKU6216	Social and Humanitarian Literacy	2			2		3	
	FACULTY COURSES								
10	FMI6202	Statistics	1	1		2		1	
11	FMI6201	Insight and Study of Mathematics and Natural Sciences	2			2			4
		Subtotal credits				4			

b. Study Program Courses

Core courses of the Mathematics Education Study Program

No	Course Code	Course Name	Credit details			Amount	Prerequisite	Semester	
			T	P	L			Odd	Even
	STUDY PROGRAM COURSES								
	1. Educational Development Course								
1	PMA6331	Mathematics Education Research Methodology	3			3			6
2	PMA6833	Final Thesis Assignment			8	8			8
		Subtotal credits				11			
	2. Scientific Courses								
	a. Basic Education Courses								
3	MDK6201	Educational Science	2			2		1	
4	MDK6202	Educational Psychology	2			2		1	
5	MDK6203	Educational Management	2			2			2
6	MDK6204	Sociology and Anthropology of Education	2			2			2
		Subtotal credits				8			
	b. Learning Process Skills Course (Compulsory)								
7	PMA6301	Algebra and Trigonometry	3			3		1	
8	PMA6202	Plane Geometry	2			2		1	
9	PMA6303	Logic and Sets	3			3		1	
10	PMA6304	Differential Calculus	3			3		1	
11	PMA6205	Geometry of Space	2			2		1	

No	Course Code	Course Name	Credit details			Amount	Prerequisite	Semester	
			T	P	L			Odd	Even
12	PMA6306	Integral Calculus	3			3	MAA6304		2
13	PMA6307	Elementary Linear Algebra	3			3	MAA6303		2
14	PMA6308	Algorithms and Programming	2	1		3	MKU6212		2
15	PMA6309	Data Analysis and Visualization	2	1		3	FMI6202		2
16	PMA6210	Psychology of Learning Mathematics	2			2		3	
17	PMA6211	English Mathematics Learning	2			2	MKU6211	3	
18	PMA6212	Analytical Geometry of Plane	2			2	MAA6202	3	
19	PMA6313	Computer Applications	2	1		3	MAA6308	3	
20	PMA6314	Differential Equations	3			3	MAA6304	3	
21	PMA6315	Linear Program	3			3	MAA6307	3	
22	PMA6216	Number Theory	2			2		3	
23	PMA6217	Mathematics Curriculum and Learning	2			2			4
24	PMA6318	Mathematics Learning Strategies	3			3			4
25	PMA6219	Innovation in Manipulative Mathematics Learning Media	1	1		2	MKU6212		4
26	PMA6220	Mathematics Learning Assessment	2			2			4
27	PMA6221	Philosophy of Mathematics Education	2			2			4
28	PMA6222	Middle School Mathematics Study 1	1	1		2			4
29	PMA6223	Analytical Geometry of Space	2			2			4
30	PMA6324	Discrete Mathematics	3			3	MAA6303		4
31	PMA6325	Probability Theory	3			3	MAA6303		4
30	PMA6326	Mathematics Learning Planning	3			3	PMA6203	5	
31	PMA6327	Interactive Mathematics Learning Media	2	1		3		5	
32	PMA6228	Middle School Mathematics Study 2	1	1		2	PMA6306	5	
33	PMA6229	Transformation Geometry	2			2		5	
34	PMA6330	Numerical Methods	3			3		5	
35	PMA6232	History of Mathematics	2			2			6

No	Course Code	Course Name	Credit details			Amount	Prerequisite	Semester	
			T	P	L			Odd	Even
		Subtotal credits				78			
	c. Practical Learning Courses								
36	PEN6201	Microlearning		1	1	2			6
37	PEN6601	Educational Practice			6	6		7	
		Subtotal credits				8			

c. Elective Courses

The elective study program courses are divided into 5 interest groups, namely Algebra,Analysis and Geometry, Applied Mathematics, Computer Science, and Statistics. This course is also offered to students from other study programs, both within and outside UNY.

Table 12. Elective Courses in Mathematics Education

No	Course Code	Course Name	Credit details			Amount	Prerequisite	Semester	
			T	P	L			Odd	Even
1	PMA6234	English Mathematics	2	-	-	2	PMA6202	5	
2	PMA6235	International Mathematics Education Study	2	-	-	2	PMA6203	5	
3	PMA6236	Mathematics Learning for Gifted Students	2	-	-	2	PMA6201	5	
4	PMA6237	Selected Chapters on Mathematics Education	2	-	-	2		5	
5	PMA6238	Virtual Mathematics Learning Media	1	1	-	2	PMA6205	5	
6	PMA6239	Qualitative Research on Mathematics Education	2	-	-	2			6
7	PMA6240	STEM Learning Approach	2	-	-	2			6
8	PMA6241	Ethnomathematics	2	-	-	2			6
9	PMA6242	HOTS Mathematics Study	2	-	-	2			6
10	PMA6243	Development of Mathematics Learning Videos	1	1	-	2	PMA6205		6

d. Courses Outside the Study Program at UNY

Extramural Courses at UNY (LPdU) are elective courses taken outside the original study program to fulfill additional CPL requirements taken from similar or different

study programs within UNY. There are three additional CPLs determined to enrich the competencies of Mathematics Study Program graduates, as follows.

1). Students have insight into learning mathematics

Students can fulfill this competency by taking courses in the UNY Mathematics Education Study Program or other Education Study Programs at UNY that offer mathematics learning enrichment courses.

2). Students are able to apply data management skills in accordance with broader developments in information technology.

Students can fulfill this competency by taking courses in the Statistics Study Program at UNY or other study programs at UNY that offer courses related to enriching data analysis and management, including big data.

3). Students are able to develop creativity, independence and entrepreneurship.

Students can fulfill this competency by taking courses in other UNY study programs that offer courses related to the development of creativity, independence and entrepreneurship.

In the type of courses outside the study program at UNY, students can takesubjectwho fulfill additional CPL or who have competencies that are related to the recommended courses listed in the course distribution table.

e. UNY External Courses

UNY External Courses (LU) are taken by students to fulfill the main CPL (compulsory coursework), and to fulfill the additional CPL (elective coursework). The mandatory LU courses, worth 20 credits, apply across all study schedules, while the number of credits for elective courses varies across the three schedules.

1) Compulsory External Courses at UNY (20 credits)

Table 13. Compulsory Courses Outside UNY

No	Code	Subject	Credits				SEM		Prerequisite
			T	P	L	J	Gs	Mount	
1.	PEN6601	Educational Practice			6	6	7		
2.	MKU6614	Community Service Program			6	6	7		
3.	PMA6824	Final Thesis Assignment			8			8	
		AMOUNT							

2) Courses outside UNY are free choices (8 – 20 credits)

This course is an elective to fulfill additional CPL requirements taken outside of UNY. It can be completed in eight alternative learning formats:

1) Internship/industrial practice,
2) projects in the village,
3) student exchange,
4) research,
5) entrepreneurship,
6) independent studies/projects,
7) humanitarian projects, and
8) teaching at school.

As part of the student exchange program, students can take courses at partner universities (there are 12 partner universities, as outlined in the Appendix to UNY Rector's Regulation No. 7 of 2022) online. Recommended courses to fulfill the additional CPL requirements at partner universities are the same as those listed in the study program's elective courses.

In the type of free choice courses outside UNY, the study program directs thatstudenttake courses that fulfill additional CPL or that have competencies that are related to the elective coursesstudy program.

2. Distribution of Courses per Semester

The Mathematics Education Study Program curriculum consists of 148 credits - 152 credits, with the distribution of courses per semester divided into three study period patterns, namely 5-1-2, 6-1-1, and 6-0-2. The following table shows the number of semesters of the three study period patterns offered (UNY Rector Regulation No. 7 of 2022).

No	Number of semesters			Total Semester
	In the Study Program Itself	Other Study Programs at UNY	Outside UNY	
1	5	1	2	8
2	6	1	1	8
3	6	0	2	8

In the following distribution of courses per semester, the number of semesters outside the study program in each study period pattern is designed to be fulfilled by the number of credits that must be fulfilled by students outside the study program and outside UNY. The following is the distribution of courses per semester in the three study period patterns.

a. SEMESTER I

No	Code	Subject	Credit details			Number of credits		
			T	P	L	5-1-2	6-1-1	6-0-2
1	MKU6201	Islamic education*	2	-	-	2	2	2
	MKU6202	Catholic Religious Education*		-	-			
	MKU6203	Christian Religious Education*		-	-			
	MKU6204	Hindu Religious Education*		-	-			
	MKU6205	Buddhist Religious Education*		-	-			
	MKU6206	Confucian Religious Education*		-	-			
2	MKU6212	Digital Transformation	2	-	-	2	2	2
3	FMI6202	Statistics	1	1	-	2	2	2
4	MDK6201	Educational Science	2	-	-	2	2	2
5	MDK6202	Educational Psychology	2	-	-	2	2	2
6	PMA6301	Algebra and Trigonometry	3	-	-	3	3	3
7	PMA6202	Plane Geometry	2	-	-	2	2	2
8	PMA6303	Logic and Sets	3	-	-	3	3	3
9	PMA6304	Differential Calculus	3	-	-	3	3	3
Amount			**20**	**1**	-	**21**	**21**	**21**

b. SEMESTER II

No	Code	Subject	Credit details			Number of credits		
			T	P	L	5-1-2	6-1-1	6-0-2
1	MKU6208	Pancasila	2	-	-	2	2	2
2	MKU6209	Indonesian	2	-	-	2	2	2
3	MKU6211	English	2	-	-	2	2	2
4	MDK6203	Educational Management	2	-	-	2	2	2
5	MDK6204	Sociology and Anthropology of Education	2	-	-	2	2	2
6	PMA6205	Geometry of Space	2	-	-	2	2	2
7	PMA6306	Integral Calculus	3	-	-	3	3	3

8	PMA6307	Elementary Linear Algebra	3	-	-	3	3	3
9	PMA6308	Algorithms and Programming	2	1	-	3	2	2
10	PMA6309	Data Analysis and Visualization	2	1	-	3	2	2
Amount			**22**	**2**	-	**24**	**24**	**24**

c. SEMESTER III

No	Code	Subject	Credit details			Number of credits		
			T	P	L	5-1-2	6-1-1	6-0-2
1	MKU6207	Civic education	2	-	-	2	2	2
2	MKU6216	Social and Humanitarian Literacy	2	-	-	2	2	2
3	MKU6213	Creativity, Innovation, and Entrepreneurship	2	-	-	2	2	2
4	PMA6210	Psychology of Learning Mathematics	2	-	-	2	2	2
5	PMA6211	English Mathematics Learning	2	-	-	2	2	2
6	PMA6212	Analytical Geometry of Plane	2	-	-	2	2	2
7	PMA6313	Computer Applications	2	1	-	3	3	3
8	PMA6314	Differential Equations	3	-	-	3	3	3
9	PMA6315	Linear Program	3	-	-	3	3	3
10	PMA6216	Number Theory	2	-	-	2	2	2
Amount			**22**	**1**	**-**	**23**	**23**	**23**

d. SEMESTER IV

No	Code	Subject	Credit details			Number of credits		
			T	P	L	5-1-2	6-1-1	6-0-2
Course Packages for All Study Patterns								
1	FMI6201	Insight and Study of Mathematics and Natural Sciences	2	-		2	2	2
2	PMA6217	Mathematics Curriculum and Learning	2	-	-	2	2	2

3	PMA6318	Mathematics Learning Strategies	3	-	-	3	3	3
4	PMA6219	Innovation in Manipulative Mathematics Learning Media	1	1	-	2	2	2
5	PMA6220	Mathematics Learning Assessment	2	-	-	2	2	2
6	PMA6221	Philosophy of Mathematics Education	2	-	-	2	2	2
7	PMA6222	Middle School Mathematics Study 1	1	1	-	2	2	2
8	PMA6223	Analytical Geometry of Space	2	-	-	2	2	2
9	PMA6324	Discrete Mathematics	3	-	-	3	3	3
10	PMA6325	Probability Theory	3	-	-	3	3	3
Amount			**21**	**2**	-	**23**	**23**	**23**

e. SEMESTER V

No	Code	Subject	Credit details			Number of credits		
			T	P	L	5-1-2	6-1-1	6-0-2
Course Packages for All Study Patterns								
1	PMA6326	Mathematics Learning Planning	3	-	-	3	3	3
2	PMA6327	Interactive Mathematics Learning Media	2	1	-	3	3	3
3	PMA6228	Middle School Mathematics Study 2	1	1	-	3	3	3
4	PMA6229	Transformation Geometry	2	-	-	2	2	2
5	PMA6330	Numerical Methods	3			3	3	3
5-1-2 pattern								
6	Elective Course Mathematics Education 1							
	PMA6234	English Mathematics	2	-	-	2	-	-
	PMA6235	International Mathematics Education Study	2	-	-	2	-	-
	PMA6236	Mathematics Learning for Gifted Students	2	-	-	2	-	-

No	Code	Subject	Credit details			Number of credits		
			T	P	L	5-1-2	6-1-1	6-0-2
	PMA6237	Selected Chapters on Mathematics Education	2	-	-	2	-	-
	PMA6238	Virtual Mathematics Learning Media	1	1	-	2	-	-
7a)	Elective Courses in Other Study Programs at UNY (8 credits)*)							
	Adapting the program organizer	*Elective Courses at UNY*	8	-	-	8	-	-
		Elective Courses at UNY	8	-	-	8	-	-
6-1-1 pattern								
5	Elective Course Mathematics Education 1							
	PMA6234	English Mathematics	2	-	-	-	2	-
	PMA6235	International Mathematics Education Study	2	-	-	-	2	-
	PMA6236	Mathematics Learning for Gifted Students	2	-	-	-	2	
	PMA6237	Selected Chapters on Mathematics Education	2	-	-	-	2	
	PMA6238	Virtual Mathematics Learning Media	1	1	-	-	2	
7a)	Elective Courses in Other Study Programs at UNY (8 credits)*)							
	adjust the program organizer	*Elective Courses at UNY*	8	-	-	-	8	-
		Elective Courses at UNY	8	-	-	-	8	-
6-0-2 pattern								
6	Elective Course Mathematics Education 1							
	PMA6234	English Mathematics	2	-	-	-	-	2
	PMA6235	International Mathematics Education Study	2	-	-	-	-	2
	PMA6236	Mathematics Learning for Gifted Students	2	-	-	-	-	2

No	Code	Subject	Credit details			Number of credits		
			T	P	L	5-1-2	6-1-1	6-0-2
	PMA6237	Selected Chapters on Mathematics Education	2	-	-	-	-	2
	PMA6238	Virtual Mathematics Learning Media	1	1	-	-	-	2
7a)	Elective Courses in Other Study Programs at UNY (8 credits)*)							
	adjust the program organizer	*Elective Courses at UNY*	8	-	-	-	-	8
		Elective Courses at UNY	8	-	-	-	-	8
Amount			**21**	**2**	-	**23**	**23**	**23**

f. SEMESTER VI

No	Code	Subject	Credit details			Number of credits		
			T	P	L	5-1-2	6-1-1	6-0-2
Course Packages for All Study Patterns								
1	PEN6201	Microlearning	-	1	1	2	2	2
2	PMA6310	Mathematics Education Research Methodology	3	-	-	3	3	3
3	MAA6220	History of Mathematics	2	-	-	2	2	2
5-1-2 pattern								
6	Elective Courses for Other Study Programs at UNY							
	PMA6239	Qualitative Research on Mathematics Education	2	-	-	2	-	-
	PMA6240	STEM Learning Approach	2	-	-	2	-	-
	PMA6241	Ethnomathematics	2	-	-	2	-	-
	PMA6242	HOTS Mathematics Study	2	-	-	2	-	-
	PMA6243	Development of Mathematics Learning Videos	1	1	-	2	-	-
7a)	Elective Courses in Other Study Programs Outside UNY (12 credits)*)							

No	Code	Subject	Credit details			Number of credits		
			T	P	L	5-1-2	6-1-1	6-0-2
	adjust the program organizer	*Elective Courses Outside UNY*	12	-	-	12	-	-
		Elective Courses Outside UNY	12	-	-	12	-	-
		Elective Courses Outside UNY	12	-	-	12	-	-
6-1-1 pattern								
6	Elective Courses for Other Study Programs at UNY							
	PMA6239	Qualitative Research on Mathematics Education	2	-	-	-	2	-
	PMA6240	STEM Learning Approach	2	-	-	-	2	-
	PMA6241	Ethnomathematics	2	-	-	-	2	
	PMA6242	HOTS Mathematics Study	2	-	-	-	2	
	PMA6243	Development of Mathematics Learning Videos	1	1	-	-	2	
7a)	Elective Courses in Other Study Programs Outside UNY (12 credits)*)							
	Adapting the program organizer	*Elective Courses Outside UNY*	12	-	-	-	12	-
		Elective Courses Outside UNY	12	-	-	-	12	-
		Elective Courses Outside UNY	12	-	-	-	12	-
6-0-2 pattern								
6								
	PMA6239	Qualitative Research on Mathematics Education	2	-	-	-	-	2
	PMA6240	STEM Learning Approach	2	-	-	-	-	2
	PMA6241	Ethnomathematics	2	-	-	-	-	2
	PMA6242	HOTS Mathematics Study	2	-	-	-	-	2
	PMA6243	Development of Mathematics Learning Videos	1	1	-	-	-	2
7a)	Elective Courses in Other Study Programs Outside UNY (12 credits)*)							
		Elective Courses Outside UNY	12	-	-	-	-	12

No	Code	Subject	Credit details			Number of credits		
			T	P	L	5-1-2	6-1-1	6-0-2
	adjust the program organizer	*Elective Courses Outside UNY*	12	-	-	-	-	12
		Elective Courses Outside UNY	12	-	-	-	-	12
Amount			**19**	**1**	1	**21**	**21**	**21**

g. SEMESTER VII

No	Code	Subject	Credit details			Number of credits		
			T	P	L	5-1-2	6-1-1	6-0-2
1	MKU6614	Community Service Program	-	-	6	6	6	6
2	PKL6601	Field Work Practice	-	-	6	6	6	6
Amount			**-**	**-**	12	**12**	**12**	**12**

h. SEMESTER VIII

No	Code	Subject	Credit details			Number of credits		
			T	P	L	5-1-2	6-1-1	6-0-2
1	PMA6833	Final Thesis Assignment	-	-	8	8	8	8
Amount			**-**	**-**	**8**	**8**	**8**	**8**

J. Learning System

The learning process is implemented to achieve predetermined learning outcomes. Learning activities are carried out based on religious values, nationality, and academic ethics. Learning activities are carried out interactively, prioritizing two-way interaction between students and lecturers and between students by utilizing various learning resources and relevant information technology to foster creativity, capacity, personality, independence, and problem-solving abilities, as well as fostering logical, broad, and comprehensive thinking patterns. Learning activities can take the form of face-to-face lectures, responses and tutorials, seminars, practicums, or field practice.

To achieve the specified learning outcomes, students are required to complete a minimum study load of 148 semester credit units (SKs), which will be completed over 4

to 5 years, or 8 to 10 semesters. One semester is equivalent to 16 weeks. One SKS is equivalent to 160 minutes of learning activities per week per semester, with the details for each type of learning activity as follows.

- One credit unit in the form of lectures, responses, and tutorials includes 50 minutes of face-to-face learning activities per week per semester, 50 minutes of structured assignments per week per semester, and 60 minutes of independent learning activities per week per semester.
- One credit unit in the form of seminar learning includes 100 minutes of face-to-face learning activities per week per semester and independent learning activities per week per semester.
- One credit unit in the form of practical learning and field practice is 160 minutes per week per semester.

K. Evaluation

Learning assessments are conducted to measure the achievement of predetermined learning outcomes. Assessments are implemented based on the following principles.

- Educational, namely assessment is intended to motivate students to improve planning and learning methods to achieve learning outcomes.
- Authentic, namely assessment oriented towards a continuous learning process and learning outcomes that reflect students' abilities during learning activities.
- Objective, namely assessment is based on standards agreed upon between lecturers and students and from the influence of subjectivity.
- Accountable, namely assessment is based on clear procedures and criteria, agreed upon at the beginning of the lecture, and understood by students.
- Transparent, namely an assessment whose procedures and results can be accessed by all stakeholders.

Assessment is conducted using several techniques. Attitude assessment is carried out using observation, questionnaires, self-assessment, and peer assessment. Attitude assessment is carried out during the learning activities. Knowledge and skills assessment is carried out through written tests, oral tests, or assignments in the form of portfolios or projects. Viewed from the time and scope, written tests are divided into Mid-Semester Exams (UTS) to measure student learning outcomes in the first half of the learning activities and Final Semester Exams (UAS) to measure student learning outcomes in the second half of the learning activities. The final grade for the knowledge and skills aspect is the accumulation of assignment, UTS, and UAS scores, the formulation of which is

agreed upon between the lecturer and student, with the provision that the assignment score is weighted at least 20% of the total score. The final student grade in a course is the accumulation of attitude, attitude, knowledge, and skills scores, the formulation of which is agreed upon between the lecturer and student.

The final course grade uses a scale of 0 to 100 with a passing grade of 56. The final grade is converted into the letters A, A-, B+, B, B-, C+, C, C-, D, and E, the standards and weights of which are determined in accordance with the 2019 UNY Academic Regulations, as follows.

Table 6. Conversion of Values in Letter and Number Form

Score (Scale 0 – 100)	Mark	
	Letter	Number
86 – 100	A	4.00
81 – 85	A-	3.67
76 – 80	B+	3.33
71 – 75	B	3.00
66 – 70	B-	2.67
61 – 65	C+	3.33
56 – 60	C	2.00
41 – 55	D	1.00
0 – 40	E	0.00

The value or achievement of student learning in each semester is expressed by the Semester Achievement Index (IPS) which is obtained by adding the multiplication of the numerical value of each course and the credit weight of the relevant course divided by the number of credits of the course taken in one semester. The results of the assessment of graduate learning achievement at the end of the study program are expressed by the cumulative achievement index (IPK) which is obtained by adding the multiplication of the numerical value of each course and the credit weight of the relevant course divided by the total number of credits taken to complete the study. Students are declared to have graduated if they have completed the entire study load set and have the learning achievement of graduates set by the study program with an IPK greater than or equal to 2.00. The predicate of student graduation is determined as follows.

- Satisfactory if you achieve a GPA of 2.76 to 3.00.
- It is very satisfying to achieve a GPA of 3.01 to 3.50.
- With praise if you achieve a GPA of more than 3.50.

L. Course Description

1. Compulsory and Elective University Course Groups (MKU)

MKU6201 Islamic Religious Education;

The Islamic Religious Education course is mandatory for all Muslim students in all study programs at Yogyakarta State University. This course is designed to strengthen students' faith and piety towards Allah SWT and to develop noble morals and broaden their religious perspectives. This will produce Muslim students with noble character, philosophical thinking, rational and dynamic attitudes, and broad perspectives, while taking into account the demands of establishing harmony among fellow human beings, both within one religion and with those of other faiths.

Islamic education is mandatory for every Muslim student at Yogyakarta State University. This course is designed with the intention of strengthening students' faith and piety to Allah SWT and having noble character and broadening their horizons of religious life, so that Muslim students are formed who have noble character, think philosophically, are rational and dynamic, and have broad views, taking into account the demands of to establish harmony among human beings both in one religion and with other religious people.

MKU6202 Catholic Religious Education;

Humans as God's creatures. Revelation and faith as the foundation of religious life. Christianity and its consequences. The Sacraments of the Catholic Church, Interfaith Dialogue, Humanitarian Issues, Marriage in the Catholic Church.

Human as the image of God. Revelation and faith as the basis of religious life. Christianity and its consequences. Sacrament of Catholic Church, Interfaith dialogue, Humanitarian issues, Marriage in the Catholic Church.

MKU6203 Christian Religious Education

Christian education as a learning value. The One Almighty God. Humans, as creatures of God, behave in harmony with God's nature. Community life according to the teachings of the Bible. Moral understanding in the Bible and life. The meaning of culture

and harmony in the Bible. Biblical teachings relating to science, technology, art, law, and politics. Harmony between religious communities.

Christian Education as a value of learning. The One Almighty God. Human as the image of God, behaving in harmony with the image of God. Community life according to biblical teaching. Moral understanding in Bible and life. Cultural meaning and harmony in the bible. Biblical teaching related to science, technology, art, law, and politics. Harmony among people of various religions

MKU6204 Buddhist Religious Education

Buddhist Religious Education covers the concepts and philosophy of Buddhism, the concept of divinity, human happiness, basic moral values, science and technology, politics, and universal law from a Buddhist perspective, spiritual development exercises, and the writing of scientific papers relevant to the field of study.

Buddhism Education contains the concepts and philosophies of Buddhism, the concepts of deity, human happiness, basic moral values, science and technology, politics, and universal laws in Buddhism perspective, exercises on soul development; and scientific paper writing which is in accordance with the fields of study

MKU6205 Hindu Religious Education

Hindu Religious Education is a compulsory course for all Hindu students in all study programs. It has 3 credits, with 2 credits of face-to-face meetings, and 1 credit of Yoga Asana practice, and Bhagavad Gita, reading Sarasamuscaya. This course is designed to strengthen sradha, as well as broaden the insight of religious life in order to produce students with broad insight and noble morals who think philosophically, rationally, and dynamically, and practice what must be done in accordance with respect for both Hindu religions and harmonious relations between religions. Learning activities are carried out through lectures, dialogues, presentations, and case studies. Assessment is carried out in the form of written tests, midterm exams (UTS), final exams (UAS), independent assignments, group assignments, and presentations.

The Hinduism Education is a compulsory pass course for all Hindu students in all study programs. It has 3 credits, with 2 credits of face to face meeting, and 1 credit of practice of Yoga Asanas, and Bhagavad Gita, Sarasamuscaya reading. This course is designed to strengthen sradha, as well as expand the perspectives of religious life in order to produce broad-minded students with good characters who think in philosophical,

rational, and dynamic manners, and practice what must be done accordingly to respect both Hinduism and the harmony of inter-religious relations. The learning activities are carried out through lectures, dialogues, presentations, and case studies. Assessment is carried out in the form of written test, mid-term examination (UTS), final examination (UAS), independent assignment, group assignment, as well as presentation.

MKU6206 Confucian Religious Education

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.

Confucianism covers the urgency of religion in daily life with the right attitude. This course includes an understanding of the legal source of Confucius, knowing the history of Confucius, being able to carry out the Sacred Path brought by the Great Teachings (Thai Rights), and the role of Confucius in the development of science and technology.

MKU6207 Citizenship Education

The Civics course is mandatory for all undergraduate and graduate students, and carries 2 credits. This course equips students with the knowledge and skillsbaseregarding the relationship between citizens and the state, as well as preliminary education in defending the country in order to become citizens who can be relied upon by the nation and state. This course examines: (1) Rights and obligations of citizens (2) Preliminary education in defending the country (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.

This course discusses: (1) Citizen rights and obligations, (2) Introduction to Country Defense Education, (3) Indonesian Democracy, (4) Human Rights, (5) Archipelago insights as Indonesian Geopolitics, (6) National defense as Indonesian Geostrategy, and (7) National Politics and Strategy as the implementation of Indonesian Geostrategy.

MKU6208 Pancasila

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 constitutional system of the Republic of Indonesia and Pancasila as a paradigm of life in society, nation and state.

This lecture discusses the basis and objectives of Pancasila, Pancasila as a result of scientific thinking, Pancasila in the context of the nation's struggle history, Pancasila as a system of values and national ideology, constitution and amendments of Pancasila, and Pancasila as a paradigm of social and nation life.

MKU6209 Indonesian

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.

This course aims to equip students to have the competence to use Indonesian in writing scientific papers. The topics covered include Indonesian history, the position and function of Indonesian, Indonesian writing grammar, paragraph development, paragraph types, reasoning in paragraphs, types of scientific papers, scientific writing formats, reference writing, bibliography writing. Learning activities in the form of face-to-face lectures, discussions, giving structured assignments. Evaluation is carried out by written tests and structured assignments.

MKU6211 English

This course covers four English language skills: listening, reading, speaking, and writing. Students are expected to master grammar, speak fluently in English related to mathematics, write well in English for mathematics, translate mathematical texts into English and vice versa, and paraphrase mathematical texts.

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.

MKU6212 Digital Transformation

This course contains the latest developments in digital technology, general concepts of computer programming, describing the syntax, semantics, and runtime environment of the Python Programming Language, general concepts of computer programming (using the Python Programming Language), the role of IoT, Big Data, and AI in the Industrial Era 4.0, the concept of Big Data, the concept and application of Artificial Intelligence, and examples of the application of Machine Learning.

This course contains the final development of digital technology, general concepts of computer programming, describing syntax, semantics, and runtime environment Python Programming Language, general concepts of computer programming (using the Python programming language), the role of IoT, Big Data, and AI in the Industrial society 4.0, the concept of Big Data, the concept and application of Artificial Intelligence, as well as examples of the application of Machine Learning.

MKU6213 Creativity, Innovation, and Entrepreneurship

This course discusses entrepreneurship, including the role of entrepreneurs in the state, the reasons why graduates are required to be entrepreneurs, the role of the government in creating entrepreneurs, the definition of entrepreneurship, the skills required for entrepreneurship, entrepreneurial attitudes and profiles, entrepreneurs as complete human beings, and the causes of business failure. The course also examines techniques for developing creativity, issues, and problems faced in entrepreneurial practice.

This course discusses the role of entrepreneur for nation and country, definition of entrepreneur, abilities needed to be an entrepreneur. Character and profile of entrepreneurs. Problems of entrepreneurship. This course also discusses several techniques to develop creativity, issues, and problems about entrepreneurship in practice.

2. Selected University Course Groups

MKU6216 Social Literacy

This course contains material on general education perspectives. LSK material includes: (1) Humans as cultural beings; (2) Humans and civilization; (3) Humans as individuals and social beings; (4) Multiculturalism and equality; (5) Morality and law; (6) Humans and technology; (7) Humans and the environment; (8) ISBD in the challenges of globalization.

This course contains material about the general education perspective. This course materials include: (1) Humans as cultural creatures; (2) Humans and civilization; (3) Humans as individuals and social beings; (4) Multiculturalism and equality; (5) Morality and law; (6) Humans and technology; (7) Humans and the environment; (8) ISBD in the challenges of globalization.

3. Faculty Subject Group (MKF)

FMI6202 Statistics

The Statistics course contains discussions on: (1) the meaning and role of statistics; (2) methods of collecting and presenting data; (3) calculating and interpreting measures of central tendency, measures of location and measures of data distribution; (4) the basics of probability theory; (5) distribution of random variables; (6) sampling theory; (7) parameter estimation; and (8) hypothesis testing.

This course contains a discussion of (1) the concepts of statistics and role of statistics; (2) methods for collecting and presenting data; (3) calculation and meaning of measures of central tendency, measures of variation, and measures of location; (3) the basics of probability theory; (5) random variables and their distributions; (6) sampling distribution; (7) parameter estimation; and (8) tests of hypothesis.

FMI6201 MIPA Insights and Studies

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.

This course discusses the basic methods of Mathematics and Natural Science (scientific method) in solving problems and the way / technique of arranging conclusions based on the correct rules of reasoning (mathematical logic). It also covers the basic concepts of science and its latest developments.

4. Study Program Subject Group

Educational Development Course

PMA6331 Mathematics Education Research Methodology

This course examines the methodology of mathematics education research, which consists of (1) identification of the domain of educational research, (2) types of research, (3) identification of research problems, (4) preparation of theoretical studies, frameworks of thought, and research hypotheses, (5) sampling techniques, (6) developing research indicators and instruments, (7) validity and reliability of research, (8) data analysis techniques, and (9) preparation of research proposals.

This course covers the study of mathematical education research methodologies which include (1) identification of educational research domains, (2) types of research, (3) identification of research problems, (3) identification of research variables, (4) preparation of theoretical studies, frameworks thinking, and research hypotheses, (5) sampling techniques, (6) development of indicators and research instruments, (7) evidence of validity and reliability estimation, (8) data analysis techniques, and (9) preparation of research proposals.

PMA6833 Final Project Thesis

This course is a final project for students, presented in the form of a scientific paper based on literature studies or the application of mathematics education. The writing process refers to the Final Thesis Guidelines. Students write their final thesis under the guidance of a lecturer who is relevant to the topic they are working on. The final product of this course is a thesis article published in a mathematics education student journal, Scopus-indexed international seminar proceedings, or a reputable international journal.

This course is a student's final project which is outlined in the form of scientific writings resulting from the study of literature or the results of the application of mathematics education. The writing refers to the Thesis Final Project Guidebook. Students write their final thesis under the guidance of a lecturer in accordance with the topic the student is working on. The final product of this course is journal published in mathematics education student journals or international seminar proceedings indexed by Scopus or reputable international journals.

Scientific Courses

Basic Education Courses

MDK6201 Educational Science

This course facilitates students to understand the basic principles of education, scientific education, and its application in educational practice, which includes: educational phenomena, history of education, the nature of education and educational research, education as a system, and educational issues related to innovation in the world of education.

This course discusses the basic principles of education, educational science, and their application in educational practice which includes: educational phenomena, historical viewpoints of education, the nature of education and science of education, education as a system, and issues (educational issues in the context of educational innovation).

MDK6202 Educational Psychology

This course covers the basic concepts of educational psychology, developmental theory, individual differences, learning and teaching, learning theory, evaluation of learning outcomes, diagnosis of learning difficulties, and their application in the field of education.

The basic concepts of educational psychology, tasks and development theory, individual differences, learn and learning, learning theory, evaluation of learning outcomes, diagnostic learning difficulties, and their application in the field of education.

MDK6203 Educational Management

This course examines the basic concepts, roles, and areas of educational management, followed by an in-depth study of educational management, which consists of: students, curriculum, teaching staff, educational facilities, educational costs, management of educational institutions and the relationship between educational institutions and the community, as well as educational leaders and educational supervision.

This course discusses the basic concepts, roles, and scope of educational management, followed by an in-depth study of management of the field of educational management, which includes: students, curriculum, educational staff, educational facilities, educational funding, management of educational institutions and relationships

educational institutions with the community, as well as educational leadership and educational supervision.

MDK6204 Sociology and Anthropology of Education

Education as a socio-cultural process. Concepts, socio-cultural methodologies in education, variations in educational issues. The importance of socio-cultural climate, approaches, and influences, both within and outside of school (family, groups, communities, and mass media) in a multicultural society, especially for Indonesian society, in realizing educational goals both now and in the future.

Education as a socio-cultural process. Concepts, sociocultural methodologies in education, various cases and educational problems. The importance of climate, approaches, and sociocultural influences, both from school and from outside the school (family, peer group, community-nation, and mass media) in a multicultural (pluralistic) society and education that is most suitable for Indonesian people in realizing the goals of national education both present and future.

Learning Process Skills Course (Compulsory)

PMA6301 Algebra and Trigonometry

This course discusses 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 is able to apply them to problems in everyday life.

This course discusses understanding of angles, and quantities used in measurements, definitions of trigonometry functions and their expansion for non-singular angles, various equations and inequalities of Trigonometry functions, various graphs of simple trigonometry functions, summations and multiplication of two trigonometry functions are simple and able to apply them to related problems.

PMA6202 Plane Geometry

This course covers the understanding of basic elements in geometry, angles, parallelism, triangles, quadrilaterals, congruence, geometric constructions, area and

perimeter of plane figures, polygons (n-sided), similarity, Pythagoras' theorem, and circles.

This course discusses the basic objects in geometry, angle, parallelism, triangle, quadrilateral, congruence, similarity, geometric construction, area and perimeter, polygons, Pythagorean Theorem, and circle.

PMA6303 Logic and Sets

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

This course discusses statements, Truth tables, tautology, contradiction, contingency, quantifier, arguments, definition of a set, operations on a set, relations, equivalence relations, functions, cardinality of a set.

PMA6304 Differential Calculus

The Differential Calculus course discusses the concepts of the real number system, coordinate systems, functions, function limits and continuity, function derivatives, the use of derivatives in various maximum-minimum problems, limits at infinity, infinite limits, advanced graphical representation and the mean value theorem.

The course contains discussion on concepts of real number systems, coordinate systems, functions, limit functions and continuity, derivative functions, minima and maxima problems, limits at infinity, infinite limits, graphs of equations and the mean value theories for derivatives.

PMA6205 Spatial Geometry

This course covers various types of geometric shapes and the relationships between geometric shapes, drawing geometric objects, angles, distances, perpendicular lines, polygons, cylinders, cones, and spheres.

This course discusses elements of space and their relationships, drawing geometrical objects, perpendicularity, angle, distance, polyhedrons, cylinder, cone, and sphere

PMA6306 Integral Calculus

This course examines indefinite and definite integrals, fundamental integral theorems, applications of definite integrals, transcendent functions, integration techniques, indefinite forms and improper integrals.

The course contains discussion on Indefinite integral, definite integral, fundamental theorem of integrals, applications of the integral, transcendent function, integration techniques, indeterminate forms, and improper integrals.

PMA6307 Elementary Linear Algebra

This Linear Algebra course discusses the concept of linear equation systems, Gaussian elimination, and Gaussian-Jordan elimination, matrices and matrix operations, matrix arithmetic rules, types of matrices, methods for finding inverse matrices, inverse matrix operations, determinant functions, calculating determinants with row reduction, properties of determinant functions, cofactor expansion and Cramer's rule, the relationship between homogeneous SPLs, inverse matrices and determinants, applications of inverse matrices in cryptography, vectors (analytic), vector norms, dot products, projections, cross products in R2 and R3, and Euclidean n-space, row space, column space, rank.

This Linear Algebra course discusses the concepts of matrices and matrix operations, the rules of matrix operations, types of matrices, elementary matrices and inverse matrix methods, inverse matrix operations, systems of linear equations, Gauss elimination, and Gauss-Jordan elimination, determinant function, calculates determinant by line reduction, properties of determinant functions, cofactor expansion and Cramer rules, linkages between homogeneous linear equations, inverse matrix and determinant, application of inverse matrix on cryptography, vectors (analytic), norms vector, the point projection, cross product on R2 and R3 , and euclide -n space.

PMA6308 Algorithms and Programming

Algorithms and Programming discusses problem solving (mathematical), the compilation and presentation of solution steps, and the creation of programs using the Pascal Programming Language. Topics studied include: (1) problem solving and its solution, (2) algorithms and how to present them, (3) Pascal language structure and data types, (4) input-output commands, variables, and arithmetic operations, (5) logical operators and decision-making structures IF-THEN-ELSE, and CASE-OF, (6) iteration and recursion, (7) FOR-TO-DO, WHILE-DO, and REPEAT-UNTIL looping structures, (8) use of mathematical functions, (8) dimensional/indexed data types (arrays), (9) modular

programming: procedures and functions, (10) record data types (complex data structures), and (11) text data types.

This course discusses problem solving (mathematics), preparation and presentation of the steps to solve it, and programming using the Pascal Programming Language. The topics studied include: (1) problem solving and solution, (2) algorithms and how they are presented, (3) the structure of Pascal language and data types, (4) input-output, variables, and arithmetic operations commands, (5) logical operators and IF-THEN-ELSE, and CASE-OF decision making structures, (6) looping iterations and recursions, (7) looping structures FOR-TO-DO, WHILE-DO, and REPEAT-UNTIL, (8) use of functions - mathematical functions, (8) dimensioned / indexed (array) data types, (9) modular programming: procedures and functions, (10) recording data types (records),(complex data structures), and (11) text data types (text).

PMA6309 Data Analysis and Visualization

This course covers an introduction to R, chi-square test for univariate categorical data, chi-square test for bivariate categorical data, simple linear regression, multiple linear regression, one-way analysis of variance, two-way analysis of variance, basic data manipulation, data manipulation, merging multiple data frames, data cleaning, visualization of categorical data, visualization of continuous data, visualization of categorical and continuous data simultaneously, map visualization.

This course includes an introduction to R, chi-square test for univariate categorical data, chi-square test for bivariate categorical data, simple linear regression, multiple linear regression, one-way analysis of variance, two-way analysis of variance, basic data manipulation, data manipulation, merging multiple data frames, data cleaning, categorical data visualization, continuous data visualization, categorical and continuous data visualization simultaneously, map visualization.

PMA6210 Psychology of Learning Mathematics

This course contains discussions about intelligence, the formation of mathematical concepts, the idea of schemes, types of intelligence, types of imagery, interpersonal and emotional factors that influence the process of learning mathematics, various learning theories, how to diagnose difficulties in learning mathematics, and how to remediate difficulties in learning mathematics.

This course discusses intelligence, the formation of mathematical concepts, ideas from schemes, types of intelligence, types of imagery, factors that influence the learning process of mathematics, various theories of learning mathematics, how to diagnose difficulties in learning mathematics, and how to relieve the difficulties of learning mathematics.

PMA6211 English Mathematics Learning

This course covers the four core literacy skills in English: reading, writing, listening, and speaking. It focuses on a mathematical context. Selected articles or research publications in mathematics are used to practice effective reading and comprehension. Listening and speaking skills are integrated during discussions of reading or writing assignments. These skills are primarily facilitated through presentations to communicate ideas, ask questions, and respond to others' comments.

This course covers four main literacy skills in English: reading, writing, listening and speaking. These are focused on mathematics context. Selected articles or research publications in mathematics are used to practice effective reading and comprehension. Listening and speaking skills are integrated during discussions on reading or writing tasks. These skills are particularly facilitated through presentations to communicate ideas, raise questions and respond to other comments.

PMA6212 Analytical Geometry of Plane

This course covers geometric objects in two dimensions, points, lines, circles and conic sections, which are discussed using algebraic language.

This course includes geometric objects in the plane, namely points, lines, circles and conic sections discussed using algebraic language.

PMA6313 Computer Applications

The Computer Applications course is worth 2 credits and covers material on: introduction to mathematical software - both commercial and free, comparison of the features of the mathematical software, and the use of several free mathematical software to solve mathematical problems and process mathematical documents. In this course, students learn to use several free mathematical software that have the ability to solve mathematical problems analytically (exactly) and numerically and for processing mathematical documents, for example Euler Maths Toolbox (EMT), Octave, Maxima, Scilab, GeoGebra, and LaTeX software.

The use of this free software is based on the fact that the UNY Mathematics Education Department does not yet have legally licensed commercial mathematics software (the process of procuring such software is not easy) and the fact that there are free mathematics software that have capabilities that are not inferior to commercial software.

This course is about introduction of mathematical software - both commercial and free, comparison of features of mathematical software, and the use of several free mathematical software to solve mathematical problems and process mathematical documents. In this course students learn to use some free mathematics software that has the ability to solve mathematical problems in an analytical (exact) or numerical manner and for processing mathematical documents, for example Euler Maths Toolbox (EMT), Octave, Maxima, Scilab, GeoGebra, and LaTeX software. The use of free software is based on the fact that the Mathematics Education Department of UNY does not have commercial mathematical software that is legally licensed (the process of procuring such software is not easy) and the fact that free mathematical software has the ability to be not inferior to commercial software.

PMA6314 Differential Equations

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

This course includes definition and solution of differential equation, exact solution of first order equation, method of grouping, integrating factor, separable equation, homogeneous equation, linear equation, Bernoulli equation, special integrating factor, special transformation, homogeneous equation with constant coefficients, undetermined coefficients method, variation of parameters, and Cauchy-Euler equation.

PMA6315 Linear Programming

This course consists of modeling real-world problems and introducing linear programming models. Linear Programming studies the definitions of convex sets, feasible sets, intersection points, and optimal solutions in depth. It also addresses linear programming problems using graphical and simplex methods, the simplex method with general constraints, the two-step simplex method, simplex method theory, sensitivity analysis, iterations of linear programming problems, and integration between linear programming and transportation problems.

This course deals with modeling real problems into the linear programming model. Furthermore, the definition of the convex set, the feasible set, the extreme point, the optimum solution in the hyper plane will be discussed. Solving linear programming problems with graphical methods and primal simplex methods, simplex methods with common constraints, two-stage simplex method, duality, simplex method theory, sensitivity analysis, some special occurrences of linear programming problems, integer programming and transportation problems.

PMA6216 Number Theory

This course examines the properties of integers. It covers mathematical induction, divisibility relations, Greatest Common Factor (GCF), Least Common Multiple (LCM), fundamental numbers, prime numbers, factorization, congruence and its applications, Fermat's and Wilson's theorems, arithmetic functions, Euler's theorem, primitive roots, and indices.

This course contains the properties of integers and relationships. Topics covered include mathematical induction, relations of division, the greatest common divider (GCD), The Least Common Multiplication (LCM), base numbers, prime numbers, single factorization, congruence and its applications, linear congruence, Fermat and Wilson's theorem, arithmetic functions, Euler theorems, primitive roots and indexes.

PMA6217 Mathematics Curriculum and Learning

This course studies assessment of, (1) concepts, types, models of curriculum development, (2) curriculum components consisting of competency standards, content standards, process standards, and assessment standards, (3) history of curriculum development in Indonesia, (4) educational level curriculum, (5) mathematics learning tools.

This course discusses an assessment of (1) understanding, type, basis, and model of curriculum development, (2) curriculum component consisting of competency standards, standardization, process standards and assessment standards, (3) history of curriculum development in Indonesia, (4) education unit level curriculum, (5) mathematics learning tools

PMA6318 Mathematics Learning Strategies

This course contains discussions about Mathematics Learning Strategies, Approaches, Methods, and Models. The strategies/approaches/methods/models discussed include Contextual Teaching and Learning (CTL), Realistic Mathematics Education (RME), Problem-based Learning (PBL), Project-based Learning (PjBL), Open-Ended, Scientific, Brain-based Learning (BBL), Expository, Discovery Learning, Inquiry Learning, Cooperative Learning, and Coollaborative Learning. In addition, it also discusses Learning and Teaching Mathematics and Strategies for involving students in questions and answers, discussions, and homework.

This course contains a discussion of Strategies, Approaches, Methods, and Mathematics Learning Models. The strategies/approaches/methods/models discussed include Contextual Teaching and Learning (CTL), Realistic Mathematics Education (RME), Problem-based Learning (PBL), Project-based Learning (PjBL), Open-Ended, Scientific, Brain-based Learning (BBL), Expository, Discovery Learning, Inquiry Learning, Cooperative Learning, and Coollaborative Learning. In addition, it also discussed Learning and Teaching Mathematics as well as strategies for involving students in questions and answers, discussions, and homework.

PMA6219 Innovation in Manipulative Mathematics Learning Media

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, for use 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.

This course discusses the concept of practical and effective mathematics learning media. The development of learning media is based on current needs. In addition, the development of learning media is intended to help teachers instill concepts in students

and avoid misconceptions. In this lecture, students practice compiling various manipulative teaching aids, which are used for learning in junior high schools, such as media to teach transformations, media to understand the concept of integer operations, and media to prove the Pythagorean theorem.

PMA6220 Mathematics Learning Assessment

This course discusses: basic concepts in educational assessment; government policies related to assessment, validity and reliability of instruments; forms of test or non-test instruments; planning, preparation and development of test and non-test instruments for mathematics learning; and if time permits, item analysis is carried out: test instruments, alternative tests, and non-tests; theoretically and empirically (manually and computer program packages).

This course discusses basic concepts in educational assessment; government policies related to the assessment, validity and reliability of instruments; forms of test or non-test instruments; planning, prototyping and developing test and non-test instruments for mathematics learning; and if possible, practicing item analysis: test instruments, alternative tests, and non-tests; theoretically and empirically (manuals and computer programs).

PMA6221 Philosophy of Mathematics Education

The course covers an in-depth study of the nature, methods, and values of mathematics and mathematics education. The subject matter of the philosophy of mathematics includes 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 subject matter of the philosophy of mathematics education includes 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.

The lesson covers the in-depth study of the nature, the method and the value of mathematics and mathematics education. The material objects of the philosophy of mathematics consist of the history of mathematics, the foundation of mathematics, the concept of mathematics, the object of mathematics, the method of mathematics, the development of mathematics, the hierarchy of mathematics and the value of mathematics. The material objects of the philosophy of mathematics education consist

of the ideology and the foundation of mathematics education as well as the nature, the method and the value of education, curriculum, educator, learner, aim of teaching, method of teaching, teaching facilities, teaching assessment.

PMA6222 Secondary School Mathematics Study 1

This course examines mathematical topics related to the mathematics taught in secondary schools. These topics include: intuition and proof, fundamentals of number theory, equation theory, measurement (area and volume), triangles, trigonometry, the real number system, functions and modeling, geometric transformations, data analysis and probability, and mathematical understanding and mathematical connections. Broadly speaking, the focus of the Secondary Mathematics Study course is to bridge the gap between college mathematics and school mathematics so that students have adequate mathematical knowledge and skills beyond the mathematics taught at the secondary school level. Furthermore, by studying various mathematical topics in this course, students are expected to better understand the learning trajectory of various school mathematics topics.

This course discusses mathematical topics that are studied in secondary schools. The topics are: intuition and proof, the basics of number theory, equation theory, measurement (area and volume), triangles, trigonometry, real number systems, functions and modeling, geometric transformation, data analysis and probability, mathematical understanding and mathematical connections . In general, the focus of this course is to relate mathematics in higher education and mathematics in high school, such that students have adequate mathematical knowledge and skills. Furthermore, by discussing various mathematical topics in this course students are expected to be able to better understand the learning trajectory of various topics

PMA6223 Analytical Geometry of Space

This course contains elements in geometry, surfaces, and their relationships in 3-dimensional space (3-dimensional coordinate systems, plane shapes, lines, spheres, paraboloids, ellipsoids, and hyperboloids) using algebraic language.

This course discusses geometric elements, surfaces and their relationships in three dimensions (3-dimensional Coordinate System, Plane, Line, Sphere, Paraboloida, Ellipsoida, and Hyperboloida) using algebraic language.

PMA6324 Discrete Mathematics

This course discusses the concept of thinking with mathematical logic, theories and relationships and mathematical induction, principles of enumeration, permutations, combinations, generating functions, recurrence relationships and graph theory and their applications in several fields.

This course discusses the concepts of thinking with mathematical logic, theory and relations and induction of mathematics, enumeration principles, permutations, combinations, generating functions, recurrence relations and graph theory and its application in several fields.

PMA6325 Probability Theory

This course studies the concepts in probability theory, namely combinatorics, several definitions of probability, random variables and their distributions, the properties of random variables, and the joint distribution of random variables.

The course is more focused on probability concepts. The materials of probability theory are combinatorial methods, probability, random variables and their distributions, joint distributions, properties of random variables, and functions of random variables.

PMA6326 Mathematics Learning Planning

This course studies the concept of instructional design and its applications, consisting of basic concepts, learning approaches, learning models based on Dick and Carrey, learning objectives, evaluation of learning output designs, design of learning activities based on learning models/strategies/approaches.

This course contains the concept of instructional design and its application which includes its basic concepts, approach to learning, learning models according to Dick and Carrey, learning objectives, evaluation design of learning outcomes, learning activities design according to a model / strategy / approach to learning.

PMA6327 Interactive Mathematics Learning Media

The Interactive Mathematics Learning Media course aims to provide students with the skills and knowledge to design, develop, and use interactive mathematics learning media. The course focuses on the use of technology and digital tools to create dynamic

and engaging learning experiences and enhance student engagement and understanding through interactive media.

The course Interactive Mathematics Learning Media is designed to equip students with the skills and knowledge needed to design, develop, and utilize interactive media for mathematics instruction. This course focuses on using technology and digital tools to create dynamic and engaging learning experiences, enhancing student engagement and understanding through interactive media.

PMA6228 Secondary School Mathematics Study 2

This course examines mathematical topics related to the mathematics taught in secondary schools. These topics include: intuition and proof, fundamentals of number theory, equation theory, measurement (area and volume), triangles, trigonometry, the real number system, functions and modeling, geometric transformations, data analysis and probability, and mathematical understanding and mathematical connections. Broadly speaking, the focus of the Secondary Mathematics Study course is to bridge the gap between college mathematics and school mathematics so that students have adequate mathematical knowledge and skills beyond the mathematics taught at the secondary school level. Furthermore, by studying various mathematical topics in this course, students are expected to better understand the learning trajectory of various school mathematics topics.

This course discusses mathematical topics that are studied in secondary schools. The topics are: intuition and proof, the basics of number theory, equation theory, measurement (area and volume), triangles, trigonometry, real number systems, functions and modeling, geometric transformation, data analysis and probability, mathematical understanding and mathematical connections . In general, the focus of this course is to relate mathematics in higher education and mathematics in high school, such that students have adequate mathematical knowledge and skills. Furthermore, by discussing various mathematical topics in this course students are expected to be able to better understand the learning trajectory of various topics.

PMA6229 Transformation Geometry

This course studies isometric transformations and similarity transformations from plane to plane in geometry. Transformations are studied synthetically and analytically. The isometric transformations studied include translation (shift), reflection (mirroring), rotation (rotation), dilation (enlargement). The similarity transformation studied is

dilation. Each transformation is studied in terms of its concept/understanding and principles. The composition between isometric transformations, between similarity transformations, and between isometric transformations and similarity transformations to produce new transformations is also studied.

This course studies the concepts and principles of isometric transformation and similarity transformation onto the plane synthetically, analytically and using matrices. Isometric transformation includes translation, reflection, rotation, and glide reflection, while the similarity transformation includes dilation. Each transformation is reviewed for its concept/understanding and principles. Also learned about the composition between isometric transformations, between similarity transformations, and between isometric transformations and similarity transformations, to produce new transformations.

PMA6330 Numerical Method

The Numerical Methods course is worth 3 credits and covers the following topics: errors in numerical approximations, numerical solutions of systems of linear equations, numerical approximations of the roots of nonlinear equations, interpolation, numerical derivation and integration, and numerical solutions of ordinary differential equations (initial value problems). Several numerical methods for solving mathematical problems are introduced in this course. As a unit of this course are practical activities using computer programs (Euler Maths Toolbox, Octave, SCILAB, or MATLAB, etc.) to implement algorithms and solve related mathematical problems numerically. In this course, students learn to use various alternative solutions to mathematical problems numerically, practicing systematic and algorithmic thinking – that is, solving problems step by step to draw a conclusion. Therefore, after completing this course, students are expected to be able to use appropriate numerical methods using a special mathematical programming language to solve mathematical problems. This ability can be useful for solving mathematical problems that cannot be solved exactly (analytically).

The Numerical Method course weighs 3 credits and includes material on: errors in numerical approximations, numerical solving of linear equation systems, numerical approximation of roots of nonlinear equations, interpolation, numerical derivation and integration, and solving ordinary differential equations (initial value problems) numerically. numeric. Several numerical methods for solving mathematical problems are introduced in this course. As a unit of this course are practical activities using

computer programs (Euler Maths Toolbox, Octave, SCILAB, or MATLAB, etc.) to implement algorithms and solve related mathematical problems numerically.
In this course, students learn to use various alternative solutions to mathematical problems numerically, practice thinking systematically and algorithmically – that is, solving problems step by step to draw a conclusion. Therefore, after completing this course, students are expected to be able to use appropriate numerical methods using a special mathematical programming language to solve mathematical problems. This ability can be useful for solving mathematical problems that cannot be solved exactly (analytically).

PMA6232 History of Mathematics

In general, the History of Mathematics course aims to provide insight into the development of mathematical concepts across various civilizations. This course examines: Numeral Systems, Babylonian and Egyptian Mathematics; Euclid and his work (The Elements); Pythagoras and Descartes; Greek Mathematics; Chinese Mathematics; Indian Mathematics; Islamic Mathematics; Medieval European Mathematics; the History of Algebra; the Development of Non-Euclidean Geometry; the Development of Calculus; and the Development of Statistics and Probability Theory.

In general, the subject of Mathematics History is intended to provide insight into the development of mathematical concepts from several civilizations. In this course we study about: mathematical systems; Babylonian and Egyptian numerical, Euclid and His Work (The Elements); Pythagoras and Descartes; Greek Mathematics; Chinese Mathematics; Indian Mathematics; Islamic Mathematics; Medieval European Mathematics, Algebraic History; Non-Euclidean Geometry Development; Calculus Development; and Development of Statistics and Probability Theory.

Practical Learning Course

PEN6201 Microlearning

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

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PEN6601 Educational Practice

The Introduction to School Field course, hereinafter abbreviated as PLP, is a process of observation and internship undertaken by Bachelor of Education students to learn aspects of learning and education management in educational units. The implementation activities and timing are adjusted according to the school calendar. The objectives of the PLP course are to observe, observe, practice teaching, and develop the teaching competencies of students as prospective teachers/educators.

The Introduction to School Field Course, hereafter abbreviated as PLP, is the process of observation/observation and apprenticeship conducted by students of the Bachelor of Education Program to study aspects of learning and management of education in educational units. Implementation activities and their time are adjusted to the school calendar. The objectives of the PLP course are to observe, observe, practice teaching and develop the teaching competence of students as prospective teachers/educators.

Learning Process Skills Course (Elective)

PMA6234 English Mathematics

This course provides students with the opportunity to review English-language mathematics textbooks and articles published in reputable international journals. These books and articles can be used as resources to develop learning tools and scientific articles to support their final assignments. Students are encouraged to present their articles in English. Additionally, students gain knowledge and experience to practice preparing for the IELTS exam and to apply for scholarships.

This course facilitates students to review the latest English mathematics books and articles published in reputable international journals. The books and articles can be used as a reference in developing learning tools and scientific papers that support the students' final essay. Students are facilitated to present the scientific papers in English. In addition, students also get the knowledge and practice of IELTS to obtain scholarships abroad.

PMA6235 International Mathematics Education Studies

This course explains education systems, curricula, learning strategies, and learning evaluation systems from various countries. It also encourages students to study and analyze the results of international surveys on student mathematics ability, such as TIMMS and PISA, in various countries.

This course elaborates the education systems, the learning curriculum, the learning strategies, and the evaluation systems in several countries. This subject also discusses

and analyzes the international surveys' results on the students' mathematical abilities such as TIMSS and PISA in several countries.

PMA6236 Mathematics Learning for Gifted Students

The Gifted and Talented Mathematics Teaching course is designed to equip students with the knowledge and skills to design and implement effective mathematics teaching strategies for gifted and talented students or those who demonstrate high potential in mathematics. This course covers identifying the characteristics of gifted students, developing a challenging curriculum, and appropriate teaching techniques to meet their educational needs.

The course Mathematics Instruction for Gifted Students is designed to equip students with the knowledge and skills needed to develop and implement effective mathematics instruction strategies for gifted or highly capable students. This course covers identifying the characteristics of gifted students, developing challenging curricula, and employing appropriate teaching techniques to meet their educational needs.

PMA6237 Selected Chapters in Mathematics Education

This course facilitates students to learn about contemporary issues in the field of mathematics education, using this information to design learning activities and to write scientific papers that can help in the preparation of final thesis assignments.

In this course, students are facilitated to study the latest issues in mathematics education, use the knowledge developed to design learning activities and to write scientific papers that can support the preparation of the final project.

PMA6238 Virtual Mathematics Learning Media

The Virtual Mathematics Learning Media course is designed to equip students with the knowledge and skills to develop and use digital and virtual media in mathematics learning. This course covers the basic concepts of learning media, the latest virtual technologies and tools, and strategies for integrating these media into mathematics teaching at various levels of education.

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tools and technologies, and strategies for integrating these media into the mathematics teaching process at various educational levels.

PMA6239 Qualitative Research in Mathematics Education

The Qualitative Research in Mathematics Education course aims to equip students with the understanding and skills to design, implement, and analyze qualitative research in mathematics education. The primary focus of this course is on qualitative approaches that enable in-depth understanding of the phenomena of mathematics learning in the classroom, as well as the interactions and experiences of students and teachers.

The course Qualitative Research in Mathematics Education aims to equip students with the understanding and skills needed to design, conduct, and analyze qualitative research in the field of mathematics education. The primary focus of this course is on qualitative approaches that allow for an in-depth understanding of mathematics learning phenomena in the classroom, as well as the interactions and experiences of students and teachers.

PMA6240 STEM Learning Approaches

The STEM Learning Approaches course is designed to equip students with an understanding of the concepts, principles, and applications of STEM (Science, Technology, Engineering, and Mathematics) learning approaches in education. This course focuses on cross-disciplinary integration and the development of critical thinking, creativity, and problem-solving skills through innovative and interactive learning approaches.

The course STEM Learning Approaches is designed to provide students with an understanding of the concepts, principles, and applications of STEM (Science, Technology, Engineering, and Mathematics) learning approaches in education. This course focuses on cross-disciplinary integration and the development of critical thinking, creativity, and problem-solving skills through innovative and interactive teaching methods.

PMA6241 Ethnomathematics

This course discusses the nature, rationale and benefits of ethnomathematics; dimensions, perspectives and positions of ethnomathematics; subjects, objects, approaches and methods of ethnomathematics; theoretical studies, research results and research approaches in ethnomathematics and mathematics learning;

understanding, identification and preliminary research of sources for the development of ethnomathematics in the form of artifacts, literary/cultural works and traditions/social interactions in the context of mathematics learning; preliminary research, reflections and surveys and case studies of ethnomathematics in locations around the residence or recommended; development of ethnomathematics-based mathematics learning tools; development of ethnomathematics-based mathematics learning models.

This course discusses the nature, rationale and benefits of ethnomathematics; dimensions, perspectives and positions of ethnomathematics; subject, object, ethnomathematical approach and method; theoretical studies, research results and research approaches in ethnomathematics and mathematics learning; understanding, identification and preliminary research of sources of ethnomathematical development in the form of artifacts, literary/cultural works and traditions/social interactions in the context of learning mathematics; preliminary research, reflection as well as surveys and ethnomathematical case studies in locations around the place of residence or recommended; development of ethnomathematics-based learning tools; development of ethnomathematics-based learning model of mathematics.

PMA6242 HOTS Mathematics Study

The Higher-Order Thinking Mathematics (HOTS) course is designed to equip students with critical, creative, analytical, and evaluative thinking skills in a mathematical context. The course focuses on developing the higher-order thinking skills necessary to solve complex problems and deeply understand mathematical concepts. It also emphasizes the application of HOTS in mathematics learning at various levels of education.

The course High Order Thinking Skills (HOTS) Mathematics Review is designed to equip students with critical, creative, analytical, and evaluative thinking skills in the context of mathematics. The focus of this course is on developing higher-order thinking skills necessary for solving complex problems and deeply understanding mathematical concepts. This course also emphasizes the application of HOTS in mathematics education at various educational levels.

PMA6243 Development of Mathematics Learning Videos

The Mathematics Learning Video Development course aims to provide students with the skills and knowledge to design, create, and use instructional videos for mathematics. This course covers basic video production concepts, effective teaching techniques through video, and strategies for increasing student engagement and understanding through visual content.

The course Development of Mathematics Learning Videos is designed to provide students with the skills and knowledge needed to design, create, and use videos as educational tools for mathematics instruction. This course covers the fundamentals of video production, effective teaching techniques through video media, and strategies to enhance student engagement and understanding through visual content.

M. Semester Learning Plan

An example of a Semester Learning Plan can be seen in the Appendix.