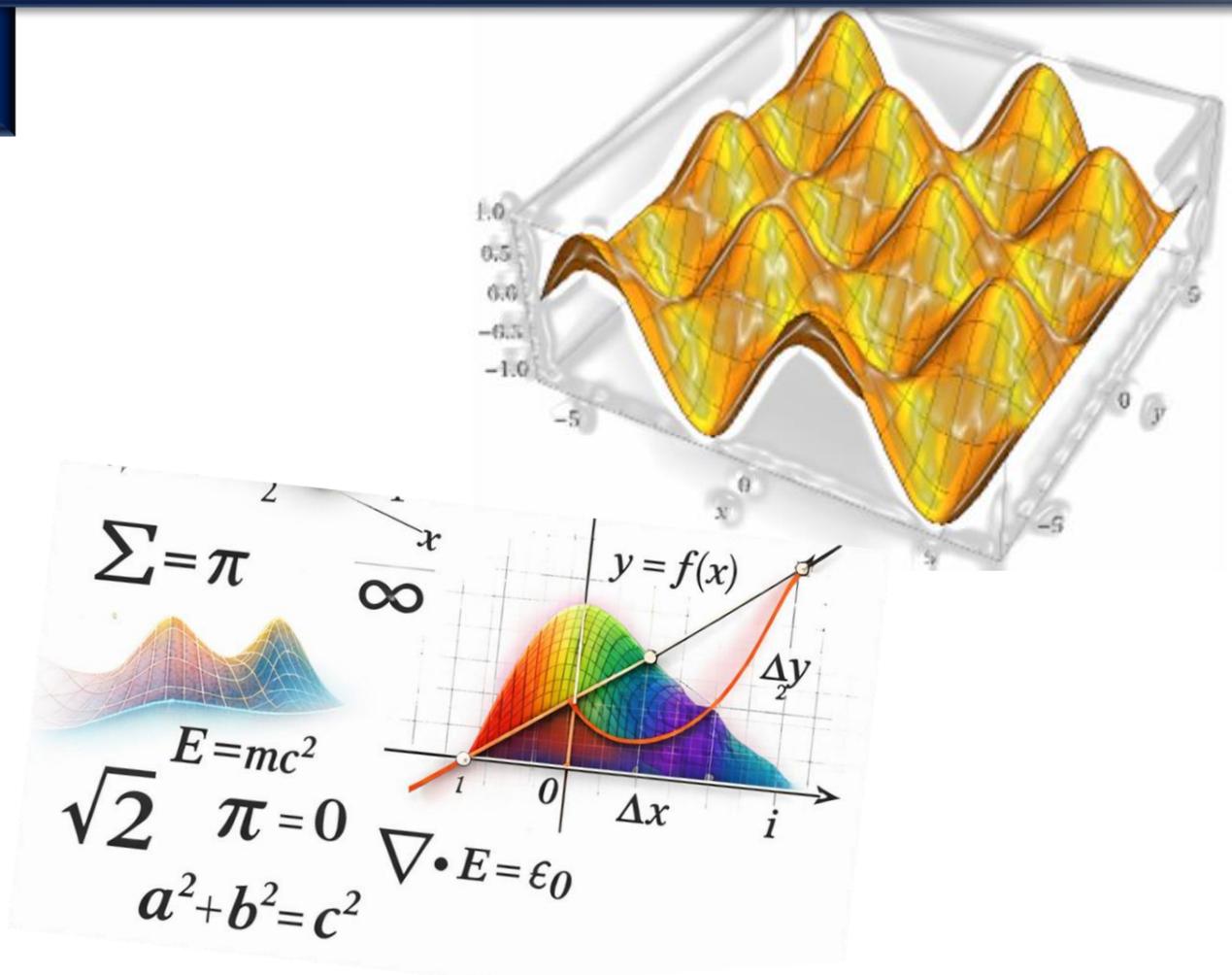




CURRICULUM 2025

BACHELOR OF SCIENCE IN MATHEMATICS PROGRAM



DEAN'S FOREWORD

Assalamu'alaikum warahmatullahi wabarakatuh,
Greetings to all of us,

Alhamdulillah, all praise and gratitude are due to Allah SWT, the Almighty God, for His abundant mercy and blessings, which have enabled the completion of the **Curriculum of Study Programs of FMIPA UNY 2025**. This academic document is developed as a scientific and strategic foundation for designing a curriculum that is adaptive to global and national dynamics.

The development of the FMIPA 2025 Curriculum is the result of a comprehensive evaluation of the implementation of the 2020 Curriculum and refers to the National Standard for Higher Education (SN-Dikti), the Indonesian National Qualifications Framework (KKNI), Ministerial Regulation No. 39 of 2025, and the need for future-oriented learning.

In line with Yogyakarta State University's (UNY) vision as a world-class educational university that is excellent, creative, and sustainably innovative, and FMIPA's vision as a faculty that is excellent, creative, and sustainably innovative in the fields of mathematics, science, and technology with global competitiveness, this academic document serves as an essential guide in formulating a curriculum that not only responds to the needs of the job market and the advancement of science and technology, but also fosters graduates who are humanistic, ethical, and committed to sustainability.

The developed curriculum adopts an Outcome-Based Curriculum (OBC) approach, emphasizing the achievement of Graduate/Program Learning Outcomes through active, collaborative, interdisciplinary learning and the use of digital technology. Elements such as 21st-century skills, innovation, entrepreneurship, biodiversity conservation, climate change, and inclusive education are integrated to produce graduates who are not only academically competent but also adaptive, reflective, and transformative.

We express our highest appreciation to the curriculum development team, lecturers, and all stakeholders who have contributed to the preparation of this academic document. It is our hope that the 2025 FMIPA UNY Academic Curriculum Document will serve as a strategic foundation for preparing future learners and leaders who are integrity-driven, innovative, and resilient in facing global challenges.

Wassalamu'alaikum warahmatullahi wabarakatuh.

Yogyakarta, 16th June 2025
Dean of FMIPA UNY

PREFACE

Alhamdulillah, all praise and gratitude are due to Allah SWT for His blessings and grace, through which the Curriculum 2025 of Bachelor of Science in Mathematics (BSM) Program has been successfully completed. This curriculum document is the result of the collaboration and commitment of many parties who have contributed throughout its preparation process.

We extend our sincere thanks to the university and faculty leadership for their full support in developing this 2025 curriculum. Our gratitude also goes to external reviewers, employers, alumni, all lecturers, students, and academic staff who actively participated in the evaluation of the previous 2020 curriculum, as well as in the drafting and review of the new 2025 curriculum.

This 2025 curriculum document is expected to serve as a guideline for the implementation of learning in the Bachelor of Science in Mathematics Program, to be applied starting from the odd semester of the 2025/2026 academic year. It has been designed to produce graduates who possess the distinctive competencies of the Bachelor of Science in Mathematics Program, namely, strong expertise in modelling, optimisation, and computation, enabling them to compete successfully in the professional world.

The 2025 Curriculum Document includes the vision, mission, objectives, graduate competencies, graduate profiles, lists of compulsory and elective courses, semester-wise course distribution, and course descriptions. We hope that this curriculum will make a substantial contribution to producing high-quality graduates at both the national and international levels and facilitate effective curriculum implementation.

We also recognise that this academic document may still contain shortcomings and limitations. Therefore, we welcome constructive feedback and suggestions for its improvement and refinement.

May this 2025 curriculum document be beneficial to all stakeholders and make a positive contribution to the quality of education within the Bachelor of Science in Mathematics (BSM) Program.

Yogyakarta, 15th June 2025
Curriculum Development Team
Bachelor of Science in Mathematics Program, FMIPA UNY

IDENTITY OF STUDY PROGRAM

Institution/University	:	Universitas Negeri Yogyakarta (UNY)
Faculty	:	Faculty of Mathematics and Natural Sciences (Fakultas Matematika dan Ilmu Pengetahuan Alam – FMIPA)
Program Type	:	Undergraduate (<i>Sarjana</i>)
Program Study Name	:	Bachelor of Science in Mathematics (BSM) Program
Address	:	Jl. Colombo No. 1, Karang Malang, Caturtunggal, Kec. Depok, Kabupaten Sleman, Daerah Istimewa Yogyakarta 55281
Phone No.	:	(0274) 565411
E-mail and Website	:	matematika@uny.ac.id / http://mat.fmipa.uny.ac.id/
Decree Number on Program Establishment	:	240/DIKTI/Kep/1997
Date of Decree Issuance	:	15 August 1997
Decree Signatory	:	Director General of Higher Education
Year of First Student Intake	:	1997
Latest Accreditation Rating	:	Excellent (<i>Unggul</i>)
Accreditation Decree Number (BAN-PT)	:	2720/SK/BAN-PT/Akred-Itnl/S/V/2021

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CURRICULUM OF BACHELOR OF SCIENCE IN MATHEMATICS PROGRAM

A. Rationale

Curriculum changes are a natural and necessary process. The development of science and technology, societal needs, the advancement of the times, and new government policies all necessitate curriculum transformation. Life in the 21st century demands fundamental changes in the higher education system. The rapid growth of information and communication technology, along with the emergence of the era of disruption, has also accelerated transformations in economic, social, and cultural domains. In such a dynamic era, transformative learning is essential to equip and prepare higher education graduates to become excellent future generations.

Curriculum development is a systematic and well-planned process consisting of four key stages: (1) development of curriculum ideas, (2) development of curriculum documents, (3) curriculum implementation, and (4) curriculum evaluation. These four dimensions are interrelated and form a unified process. As part of curriculum development, evaluation must be carried out from the initial conceptualization stage through to implementation and societal impact, ensuring that the curriculum achieves its intended outcomes. Evaluation during the idea and document development stages aims to obtain feedback on the relevance and quality of the curriculum design as formulated in the Graduate Competency Standards otherwise referred to as the Program Learning Outcomes (PLO).

The development of a new curriculum must therefore be based on the evaluation results of the previous curriculum. Evaluation and development in higher education play a vital role in responding to evolving challenges in education and the demands of the labour market. An effective curriculum must remain relevant to societal needs while fostering graduates' competencies that align with advances in science and technology.

Several key reasons underline the importance of curriculum evaluation and development:

1. **Ensuring Educational Quality:** Curriculum evaluation ensures that the quality of education aligns with national and international standards, producing competent graduates who can compete globally.
2. **Accommodating Scientific and Technological Progress:** Rapid advancements in science and technology demand continual curriculum updates. Without periodic evaluation, the curriculum risks becoming outdated and misaligned with current developments, resulting in graduates lacking up-to-date competencies.
3. **Responding to Labour Market Demands:** As the labour market evolves, it requires a workforce equipped with relevant skills. Curriculum evaluation ensures that learning materials and competencies remain aligned with current industry and societal needs

4. Improving Learning Effectiveness: Curriculum evaluation also aims to enhance teaching methods and learning strategies, making them more effective and efficient, thereby optimizing student learning outcomes.
5. Compliance with Government Policies and Regulations: Curriculum evaluation ensures alignment with current national and international regulations, such as the Ministerial Regulation (Permendikbudristek) No. 53 of 2023, which outlines the National Standards for Higher Education (SN-Dikti).

The evaluation of the 2020 Curriculum provides essential information regarding its relevance, effectiveness, and efficiency in achieving objectives and utilizing resources. These findings guide the adjustment and redesign of the new curriculum. The evaluation results also identify weak areas in the previous curriculum, allowing systematic improvements toward higher quality outcomes.

Innovative curriculum development must represent a shared commitment within higher education management. It is a complex, multidimensional, and multilevel process, beginning with analysis of the existing curriculum and proceeding through past, present, and future analyses across various dimensions of life. This includes SWOT analysis and tracer studies of graduate performance. Based on these analyses, the study program must redefine its graduate profiles, learning outcomes, courses and credits, curriculum structure, semester program design, learning standards, and assessment systems. Curriculum improvement should be carried out systemically and comprehensively, encompassing university-wide, faculty, departmental, and study program levels. To maintain consistency across all programs, FMIPA coordinates curriculum preparation within the faculty. Subsequently, the Mathematics Study Program develops its curriculum following the UNY Curriculum Development Guidelines 2025.

In 2025, Yogyakarta State University (UNY) is conducting an evaluation and simultaneously developing a new curriculum as part of its five-year curriculum development cycle. The transformation of UNY into a State University with Legal Entity (PTN-BH) also serves as a crucial context for revising the 2025 curriculum. UNY's vision - "Excellent, Creative, and Sustainably Innovative" - is translated into the faculty's vision and subsequently shapes the academic vision of each study program. This vision must be embedded in the curriculum to ensure it effectively responds to the increasingly complex challenges of the modern era and produces graduates who are globally competitive, excellent, creative, and innovative.

To achieve a curriculum that is high-quality, efficient, and effective, the Bachelor of Science in Mathematics (BSM) Program developed the 2025 Curriculum based on the evaluation results of the 2020 Curriculum.

B. Vision, Mission, and Educational Objectives of the Bachelor of Science in Mathematics (BSM) Program

The process of formulating the Vision of the BSM Program is based on written policies issued by the Rector of Yogyakarta State University (UNY) concerning the vision, mission, objectives, and strategic goals of the university, as stated in the UNY Strategic Plan (Renstra) 2023 - 2026.

In Chapter III of this strategic plan, the formulation of core values, vision, and mission is described as an integrated “trilogy” that guides UNY’s development. The core values, which have formed the foundation of UNY’s identity since its establishment as an educational university, continue to evolve along with UNY’s orientation as a higher education institution rooted in education. UNY’s core values in conducting higher education encompass Pancasila, piety, independence, intellectuality, nationalism, and democracy.

Furthermore, the formal policy documents at the faculty level are guided by the FMIPA Dean’s Decree No. B/218.8/UN34.13/HK.03/2022 concerning the Standard Operating Procedure (SOP) for Developing the Vision, Mission, Objectives, and Strategies of the Faculty of Mathematics and Natural Sciences (FMIPA), Yogyakarta State University (UNY).

1. Scientific Vision of the BSM Program

The formulation of the scientific vision of the BSM Program is grounded in the principle that it must be aligned with the vision of the faculty and the university, ensuring that the faculty contributes meaningfully to achieving UNY’s institutional goals.

The scientific vision of the BSM Program reflects its aspirations to explore and advance mathematical knowledge, with distinctive strengths and focus areas that respond to developments in science and technology and their applications. The formulation of the program’s vision considers four aspects: (1) relevance and distinctiveness of the study program’s scientific field, (2) future orientation aligned with national and global trends, (3) alignment with institutional vision (faculty and university), and (4) societal needs and stakeholder expectations.

Scientific Vision Statement

“To become a globally competitive, excellent, creative, and sustainably innovative study program in the exploration of mathematical sciences and their applications, with a focus on modelling, optimisation, and computation.”

Interpretation of the Vision

- **Globally Competitive:** The study program possesses the capability to compete internationally in education, research, and graduate quality, gaining recognition at the global level.
- **Excellent:** The study program is committed to producing outstanding graduates through high-quality teaching, research, and community service that exceed national standards.
- **Creative:** The program encourages the generation of new ideas and innovative approaches to solving problems, especially in mathematics and its applications.
- **Innovative:** The program focuses on creating new and relevant solutions, technologies, and methods in mathematical inquiry and practice.

- **Sustainable:** The program ensures long-term positive impact by considering environmental, social, and economic sustainability in its activities.
- **Exploration of Mathematics and Its Applications:** The program emphasizes both theoretical and applied mathematics, engaging deeply in the development and implementation of mathematical concepts across diverse fields.
- **Based on Modelling, Optimisation, and Computation:** These three pillars serve as the core characteristics of the Mathematics Program at FMIPA UNY. The curriculum focuses on using mathematical models to represent real-world phenomena, optimisation to find the best possible solutions, and computation to leverage technology for efficient problem-solving.

2. Mission of the BSM Program

The mission describes the actions undertaken by the program to realise its vision. Derived from the program's vision and aligned with the institutional vision of both the faculty and the university, the missions are as follows:

1. To deliver creative, innovative, and sustainable mathematics education that prepares graduates to excel in modelling, optimisation, and computation, enabling them to compete globally and pursue higher studies.
2. To conduct research that advances mathematical knowledge and its applications in modelling, optimisation, and computation for the development of science and technology.
3. To serve society by disseminating and applying mathematical knowledge to enhance public appreciation of mathematics.
4. To implement good and transparent governance in program management and to establish mutually beneficial collaborations with partners both nationally and internationally.

3. Program Educational Objective/PEO

a. Formulation of the Study Program Objectives

Program Educational Objectives (PEOs) are broad statements describing the expected career and professional achievements of graduates within the first three to five years after completing the program (Abet, 2008). These objectives align with the scientific vision of the program, faculty, and university.

The objectives of the Bachelor of Science in Mathematics, Faculty of Mathematics and Natural Sciences, Yogyakarta State University, are to produce graduates who:

- | | |
|-------|---|
| PEO 1 | To master strong mathematical knowledge enabling graduates to work across various fields and pursue higher education. |
| PEO 2 | To be capable of planning and conducting research and disseminating results under the guidance of senior researchers. |
| PEO 3 | To be able to manage projects dynamically without being confined solely to theoretical frameworks. |

PEO 4 To be capable of providing recommendations for decision-making in specific fields based on mathematical reasoning.

b. Alignment of Program Educational Objectives with Institutional Visions

The alignment between the study program's objectives (PEOs) and the visions of the university, faculty, and program is presented as follows:

Table 1. Matrix of Alignment between the PEO and the Vision of the University, Faculty, and BSM Program

PEO	UNY & FMIPA Vision			Study Program Scientific Vision				Distinctive Characteristics of the study program (modelling, optimization and computation)
	Excellence	Creativity	Continuous Innovation	Global Competitiveness	Excellence	Creativity	Continuous Innovation	
PEO 1	v			v			v	v
PEO 2		v	v		v	v	v	v
PEO 3		v					v	v
PEO 4	v		v	v		v	v	v

c. Objectives with the Indonesian National Qualifications Framework (KKNI)

The level of competence in the Indonesian National Qualifications Framework (KKNI) for a bachelor's degree is Level 6. The following is an identification of the alignment between the Program Educational Objectives (PEO) and the KKNI Level 6 description for the bachelor's degree.

Table 2. Alignment of the PEO of BSM Program with KKNI Level 6

KKNI Level 6 Descriptor	PEO			
	PEO 1	PEO2	PEO3	PEO4
Able to apply expertise and utilize science and technology in problem-solving and adapt to changing circumstances.	v	v	v	
Master theoretical concepts and formulate procedural solutions in specialized fields.	v	v	v	
Able to make decisions based on data analysis and provide direction for alternative solutions independently or collaboratively.				v
Responsible for personal work and accountable for organizational outcomes.				v

C. Graduate Profile

1. Graduate Profile and its Description

The Graduate Profile represents the distinguishing characteristics or professional roles that graduates may undertake in specific areas of expertise or employment after completing their studies. The following are the graduate profiles of the BSM Program FMIPA UNY.

Table 3. Graduate Profiles of the BSM Program

Graduate Profile	Profile Description
Academic (Scholar)	Graduates of the Bachelor of Science in Mathematics possess a strong foundation of knowledge that enables them to pursue higher education at more advanced levels.
Research Assistant	Graduates of the Bachelor of Science in Mathematics are capable of assisting in planning, collecting, and analyzing data, as well as preparing and disseminating research outputs under the supervision of a principal researcher.
Practitioner	Graduates of the Bachelor of Science in Mathematics are able to construct mathematical models to support decision-making and optimization across various sectors; they can also design data architectures and infrastructures, analyze, interpret, and visualize data to support effective decision-making.
Software Developer	Graduates of the Bachelor of Science in Mathematics can work as developers who design, create, test, and maintain both websites and mobile applications.

2. Alignment between Graduate Profiles and Program Educational Objectives (PEO)

The alignment between the graduate profiles and the Program Educational Objectives (PEO) of the Mathematics Study Program is presented as follows.

Table 4. Alignment between Graduate Profiles and PEO

Graduate Profile	PEO 1	PEO 2	PEO 3	PEO 4
1. Academic (Scholar)	V	V	V	V
2. Research Assistant	V	V		
3. Practitioner	V		V	V
4. Software Developer			V	

D. Graduate Learning Outcomes (Program Learning Outcome – PLO)

1. Formulation of Learning Outcomes

Graduate competencies encompass attitudes, knowledge, and skills, which are expressed as Graduate/Program Learning Outcomes (PLO). The PLOs are formulated by reviewing the previous set (which included 10 learning outcomes). In the 2020 Curriculum, ten (10) PLO statements were extracted from the 31 PLO statements defined by the National Standard for Higher Education (SN-Dikti).

In the 2025 Curriculum, eight (8) PLO statements were formulated by integrating aspects of attitude, knowledge, and skills, in accordance with Ministerial Regulation (Permendikbudristek) No. 39 of 2025, while also considering the recommendations of the Indonesian Mathematical Society (IndoMS) as follows.

Graduate/Program Learning Outcomes (PLO) of the BSM Program, FMIPA UNY

- PLO 1 Master mathematical concepts through exploration, generalisation, and abstraction, and prove simple mathematical properties, lemmas, and theorems using logical reasoning.
- PLO 2 Master principles of mathematical modelling, optimisation, and computation as a foundation for self-development, guided by academic ethics in professional work and further study.
- PLO 3 Think critically, creatively, innovatively, and systematically in the development of mathematics, science, and technology, both independently and collaboratively.
- PLO 4 Communicate mathematical ideas effectively in oral and written forms, grounded in academic ethics.
- PLO 5 Construct or modify mathematical models from problems in various fields, solve them, and interpret the results.
- PLO 6 Apply algorithms through mathematical approaches involving technological tools, while considering ethical, legal, and information security aspects.
- PLO 7 Analyse information and data for accurate and scientific decision-making.
- PLO 8 Collaborate effectively, adapt to changing environments, and become lifelong learners.

Comparison between the PLO of the BSM Program and the IndoMS Recommendations is presented as follows.

Table 5. Comparison between the PLO of BSM and IndoMS Recommendation

No.	Mathematics Program PLO	IndoMS Recommended PLO
PLO 1	Master mathematical concepts through exploration, generalisation, and abstraction, and prove simple mathematical properties, lemmas, and theorems using logical reasoning.	CP-PP 1: Master theoretical concepts of mathematics including mathematical logic, discrete mathematics, algebra, analysis, geometry, probability, and statistics.
PLO 2	Master principles of mathematical modelling, optimisation, and computation as a foundation for self-development, guided by academic ethics in professional work and further study.	CP-PP 2: Master principles of mathematical modelling, linear programming, differential equations, and numerical analysis.
PLO 3	Think critically, creatively, innovatively, and systematically in the development of mathematics, science, and technology, both independently and collaboratively.	–
PLO 4	Communicate mathematical ideas effectively in oral and written forms, grounded in academic ethics.	CP-KK 1: Able to communicate and develop mathematical thinking—from procedural and computational mastery to higher-level reasoning involving exploration, logic, generalisation, abstraction, and formal proof.
PLO 5	Construct or modify mathematical models from problems in various	CP-KK 3: Able to reconstruct or modify mathematical models of real-world

No.	Mathematics Program PLO	IndoMS Recommended PLO
	fields, solve them, and interpret the results.	systems/problems, analyse their structure, assess accuracy, and interpret outcomes.
PLO 6	Apply algorithms through mathematical approaches involving technological tools, while considering ethical, legal, and information security aspects.	CP-KK 2: Able to observe, identify, formulate, and solve problems using mathematical approaches with the aid of technology.
PLO 7	Analyse information and data for accurate and scientific decision-making.	CP-KK 4: Able to make appropriate decisions using alternative mathematical problem-solving methods.
PLO 8	Collaborate effectively, adapt to changing environments, and become lifelong learners.	CP-KK 5: Able to collaborate, adapt, and engage in lifelong learning.

In addition, the PLOs of the BSM Program have been aligned with the Presidential Regulation of the Republic of Indonesia No. 8 of 2012 concerning the Indonesian National Qualifications Framework (KKNI), Level 6, and the minimum PLO standards recommended by IndoMS. The following table presents the relationship between PLO and KKNI Level 6.

Table 6. Relationship between PLO of the BSM Program and KKNI Level 6

KKNI Level 6	Program Learning Outcomes (PLO)							
	1	2	3	4	5	6	7	8
Able to apply expertise and utilize science and technology in solving problems, and adapt to changing circumstances.	√	√	√	√			√	√
Master general theoretical concepts in a specific field of knowledge and specialized theoretical concepts in depth, and able to formulate procedural solutions.	√	√		√	√	√	√	
Able to make appropriate decisions based on data and information analysis, and provide guidance in selecting alternative solutions independently or collaboratively.			√		√	√	√	
Responsible for personal work and accountable for the achievement of organizational results.			√				√	√

2. Alignment between Graduate/Program Learning Outcomes (PLO) and Program Educational Objectives (PEO)

The alignment of the Graduate/Program Learning Outcomes (PLO) with the Program Educational Objectives (PEO) is presented as follows.

Table 7. Alignment between PLO and PEO of the BSM Program

NO	PLO Formulation	PEO1	PEO2	PEO 3	PEO 4
PLO 1	Master mathematical concepts through exploration, generalisation, and abstraction, and prove simple mathematical properties, lemmas, and theorems using logical reasoning.	V			
PLO 2	Master the principles of mathematical modelling, optimisation, and computation as a foundation for self-development, guided by academic ethics in professional work and further studies.	V	V		
PLO 3	Think critically, creatively, innovatively, and systematically in developing mathematics, science, and technology, both independently and collaboratively.		V		
PLO 4	Communicate mathematical ideas effectively, both orally and in writing, based on academic ethics.	V	V		V
PLO 5	Construct or modify mathematical models from problems in various fields, solve them, and interpret the results.	V	V	V	V
PLO 6	Apply algorithms through mathematical approaches involving technological tools, while considering ethical, legal, and information security aspects.			V	V
PLO 7	Analyse information and data to support accurate and scientific decision-making.			V	
PLO 8	Collaborate effectively, adapt to changing environments, and engage in lifelong learning.	V	V	V	V

3. Alignment between Graduate/Program Learning Outcomes (PLO) and Graduate Profiles

The PLOs are formulated based on the established Graduate Profiles. The alignment between PLOs and Graduate Profiles of the Mathematics Study Program, FMIPA UNY, is presented as follows:

Table 8. Alignment between PLO and Graduate Profiles

Graduate Profile	Related PLO							
	1	2	3	4	5	6	7	8
1. Academic (Scholar)	✓	✓	✓	✓	✓			✓
2. Research Assistant	✓	✓	✓	✓	✓			✓
3. Practitioner			✓		✓	✓	✓	✓
4. Software Developer			✓			✓	✓	✓

E. Study Content

1. Study Content

Each Graduate/Program Learning Outcome (PLO) of the study program contains specific study content used as the foundation for developing courses. A study content may consist of one or more branches of science and their subfields, or an integrated body of knowledge that has been recognised by the disciplinary forum

of similar study programs as the characteristic area of the field. From the study content, more detailed learning materials are derived. The breadth and depth of these learning materials refer to the PLOs stipulated in the National Standard for Higher Education (SN-Dikti).

Study content and learning materials may be updated or further developed in accordance with advances in science, technology, and the direction of disciplinary development within the study program. The determination process of study content involves relevant academic divisions or laboratories within the program. The formation of a course based on selected study content can begin by constructing a matrix linking the PLO statements with the study content to ensure alignment (see Table 12). The 2025 Curriculum of BSM is designed to fulfil all defined PLOs so that graduates possess competencies consistent with the established graduate profiles.

To achieve the program's intended goals, it is necessary to determine the study content to be taught in each course, ensuring that such content supports all PLOs of the study program. The study content has been developed by considering: the 2022 recommendations from the Indonesian Mathematical Society (IndoMS) for mathematics programs, the distinctive characteristics of the Mathematics Study Program, and stakeholder recommendations. A total of 17 study content areas have been formulated.

The following is the list of study content areas and their descriptions in the 2025 Mathematics Study Program Curriculum.

Table 9. List of Curriculum study content of Mathematics Study Program UNY

Code	Study content	Description of study content	Courses	Credit
BK1	Fundamental Attitudes and General Studies	Compulsory curriculum courses, University and Faculty Courses, including Religion, civic, language, sports, education, and sustainable development, Mathematical and Natural Sciences Overview, and entrepreneurship.	Religious Education	2
			Civic Education	2
			Pancasila Education	2
			Bahasa Indonesia	2
			English for Special Purposes	2
			Sports and Physical Fitness	2
			Mathematical and Natural Sciences Overview	2
			Mathematical and Natural Sciences Overview	2
			Creativity, Innovation, and Entrepreneurship	3
BK2	Basic Mathematics	Logic, proof methods, quantifiers, sets, relations, mappings	Logic and Set Theory	3
			Number Theory	2
BK3	Discrete Mathematics	Combinations and permutations, the inclusion principle, the pigeonhole principle, and the basics of graph theory.	Discrete Mathematics	3
			Graph Theory	3
BK4			Differential Calculus	3

Code	Study content	Description of study content	Courses	Credit
	Differential and Integral Calculus	Real number system, functions, limits, continuity, derivatives, integrals, sequences, series, vector functions, functions of two/three variables, partial derivatives, derivatives of functions of two/three variables, double/triple integrals, line integrals, surface integrals	Integral Calculus Multivariable Calculus Advanced Calculus	3 2 3
BK5	Complex Function	Complex numbers, complex functions, elementary transformations, analytic functions, complex integrals, sequences and series of complex numbers, and residues and poles	Complex Analysis	3
BK6	Real Analysis	The real number system, topology on \mathbb{R} (including compact sets), sequences of real numbers, real-valued functions, uniform continuity, sequences of real-valued functions, theorems on continuous and differentiable functions, the Riemann integral, and the Fundamental Theorem in Calculus.	Introduction to Real Analysis Real Analysis Introduction to Topology Introduction to Functional Analysis (elective course) Introduction to Measure Theory (elective course)	2 3 2 3 3
BK7	Algebra, Struktur Aljabar and its application	Linear equation systems, matrices, decomposition, vector spaces, basis and dimension, linear transformations, representation matrices, eigenvalues and vectors, inner product spaces, orthogonalization, diagonalization, difference of least squares, Cayley-Hamilton Theorem, Groups, Lagrange Theorem, cyclic groups, group homomorphisms, quotient groups, Isomorphism Theorem, permutation groups, rings, ring homomorphisms, quotient rings, integral domains, fields, polynomial rings.	Elementary Linear Algebra Linear Algebra Introduction to Group Theory Introduction to Ring Theory Module Theory (elective course) Cryptography (elective course) Applied Linear Algebra (elective course) Coding Theory (elective course) Fuzzy Logic (elective course) Finite fields and its Applications (elective course)	3 3 3 2 3 3 3 3 3 3
BK8	Linear Programming	Linear Programming Model, Graphical Method, Simplex Method, Duality, Sensitivity Analysis, Integer Linear Program, Transportation	Linear Programming Operations Research Optimization Theory and Control	3 3

Code	Study content	Description of study content	Courses	Credit
		Problems, and Assignment Problems.		
BK9	Geometry	Cartesian coordinate system, Line, Circle, Conic sections (ellipse, parabola, and hyperbola), Parameter functions, coordinate transformations, and vectors on the plane. Plane equation, Area equation, Intersection of two areas, Spherical equation, Coordinate systems in space.	Analytical Geometry	3
			Fractal Geometry (elective course)	3
			Differential Geometry (elective course)	3
			Transformation Geometry (elective course)	3
BK10	Introduction to Numerical Analysis	Error, Roots of nonlinear equations, Systems of nonlinear equations, Systems of linear equations, Interpolation, Numerical derivatives, Numerical integration, Initial Value Problems (Euler and Runge Kutta Methods).	Numerical Method	3
			Numerical Analysis (elective course)	3
BK11	Algorithm and Programming	Algorithm and Programming Concepts, Algorithm Representation, Data, Variables, Statements and Operations, Logic Flow; Array Data Structures, Subprograms (procedures, functions and recursive), Algorithm Complexity.	Algorithm and Programming	3
			Aplikasi Komputer	3
			Pemrograman Berorientasi Objek	3
			Teori Himpunan Samar	2
BK12	Differential Equations	First-order ordinary differential equations, higher-order linear ordinary differential equations with constant coefficients, series solutions, Laplace transform, systems of first-order linear ordinary differential equations with constant coefficients. First-order partial differential equations, classification and canonical form of second-order linear partial differential equations, wave equation, diffusion equation, Laplace equation	Differential Equation	4
			Partial Differential Equation	3
			Engineering Mathematics	3
			Initial and Boundary Value Problems	3
			Mathematical Biology	3
BK13	Statistics	Descriptive statistics and inference: probability, random variables, probability distributions of discrete and continuous random variables, sampling distributions, estimation, hypothesis testing, simple linear regression,	Basic Statistics	2
			Data Analysis and Visualization	3

Code	Study content	Description of study content	Courses	Credit
		determining the limits of distributions, parameter estimation methods (point and interval estimates), and properties of point estimates. Probability and distributions, some special distributions (discrete and continuous), multivariate distributions, and distributions of functions of random variables and their expectations. Introduction to stochastic processes: Markov chains, Poisson processes, and renewal processes.	Probability Theory	3
			Introduction to Mathematical Statistics	3
			Queuing Theory	3
BK14	Mathematical Modelling	The modeling process includes problem identification and formulation, mathematical model construction, interpretation, and model improvement.	Mathematical Modeling	3
BK 15	Applied Computer	Application of computer science to strengthen the competencies of data practitioners, software developers, and decision-making recommenders	Decision Support Systems	3
			Web Design Programming	3
			Digital Image Processing	3
			Mobile Device Programming	3
			Data Mining	3
			Artificial Intelligence	3
			Artificial Neural Network	3
			Database (elective course)	3
BK 16	Applied Statistics	Advanced concepts of statistics to provide an understanding of various techniques and approaches in statistical analysis, and to be able to apply statistics in various fields of research and data-based decision-making.	Regression Analysis (elective course)	3
			Nonparametric Statistics (elective course)	3
			Experimental Design (elective course)	3
			Statistical Computing (elective course)	3
			Categorical Data Analysis (elective course)	3
			Time Series Analysis (elective course)	3
			Introduction to Multivariate Statistics (elective course)	3
			Financial Mathematics (elective course)	3

Code	Study content	Description of study content	Courses	Credit
BK17	Internship and undergraduate thesis	Community Service Internship Undergraduate Thesis	Community Service	6
			Research Methodology	3
			Internship	6
			Undergraduate Thesis	8

2. Alignment between Courses and Graduate/Program Learning Outcomes (PLO) and Determination of Credit Weight

The credit (SKS) of a course reflects the total amount of time required by students to achieve the competencies defined in that course. Several factors influence the determination of the credit weight, including: the level of competency achievement expected, the depth and scope of the material to be mastered, and the learning approaches or methods used to achieve those objectives. In accordance with Ministerial Regulation (Permendikbudristek) No. 39 of 2025, the credit (SKS) refers to the amount of time allocated for student learning activities each week during one semester. These activities may take various forms of learning, and the credit unit also serves as recognition for student achievement in participating in curricular activities within the study program. The total student workload for one semester credit unit (1 SKS) is equivalent to 45 hours per semester.

Table 9. Alignment of Courses, Graduate/Program Learning Outcomes (PLO), and Credit (SKS)

No	Code	Course	PLO								Estimated Time (Minutes)	Credit Weight Determination (SKS)
			1	2	3	4	5	6	7	8		
1	MWK60201	Islamic Religious Education								v	5400	2
2	MWK60202	Catholic Religious Education								v		
3	MWK60203	Christian Religious Education								v		
4	MWK60205	Buddhist Religious Education								v		
5	MWK60204	Hindu Religious Education								v		
6	MWK60206	Confucian Religious Education								v		
7	MWK60207	Civic Education								v	5400	2
8	MWK60208	Pancasila Education			v					v	5400	2
9	MWK60209	Bahasa Indonesia			v					v	5400	2
10	MWU60201	English for Special Purposes			v	v					5400	2
11	MWU60202	Sports and Physical Fitness								v	5400	2
12	MWU60203	Education and Sustainable Development								v	5400	2
13	FMI60201	Mathematical and Natural Sciences Overview			v	v				v	5400	2
14	FMI60202	Basic Statistics	v			v					5400	2
15	SMT60201	Number Theory	v						v		5400	2
16	SMT60202	Multivariable Calculus				v	v	v			5400	2
17	SMT60203	Introduction to Real Analysis	v		v	v					5400	2
18	SMT60205	Fuzzy Set Theory				v				v	5400	2

No	Code	Course	PLO								Estimated Time (Minutes)	Credit Weight Determination (SKS)	
			1	2	3	4	5	6	7	8			
19	SMT60204	Introduction to Ring Theory	v		v	v						5400	2
20	SMT60206	Introduction to Topology			v	v						5400	2
21	SMT60301	Algorithms and Programming	v						v			8100	3
22	SMT60302	Elementary Linear Algebra	v		v			v				8100	3
23	SMT60303	Differential Calculus	v		v			v				8100	3
24	SMT60304	Logic and Set Theory	v		v	v						8100	3
25	SMT60305	Data Analysis and Visualization							v	v		8100	3
26	SMT60306	Analytic Geometry	v		v							8100	3
27	SMT60307	Integral Calculus	v		v							8100	3
28	SMT60308	Discrete Mathematics				v						8100	3
29	SMT60309	Computer Applications		v	v	v			v		v	8100	3
30	SMT60310	Introduction to Group Theory	v			v						8100	3
31	SMT60311	Linear Programming				v	v	v	v			8100	3
32	SMT60312	Probability Theory	v		v			v		v		8100	3
33	SMT60313	Linear Algebra	v			v						8100	3
34	SMT60314	Real Analysis	v		v	v						8100	3
35	SMT60315	Advanced Calculus	v		v							8100	3
36	SMT60316	Introduction to Mathematical Statistics	v					v				8100	3
37	SMT60317	Partial Differential Equations		v	v	v	v					8100	3
38	SMT60318	Complex Analysis	v		v	v						8100	3
39	SMT60319	Object-Oriented Programming		v	v	v				v		8100	3
40	SMT60320	Operations Research		v	v	v	v	v				8100	3
41	SMT60321	Graph Theory			v	v						8100	3
42	SMT60322	Numerical Methods			v	v			v		v	8100	3
43	SMT60323	Mathematical Modeling		v	v	v	v	v	v	v	v	8100	3
44	SMT60401	Differential Equations				v	v	v				10800	4
45	SMT603xx	Mathematics Elective Course 1		v	v	v					v	8100	3
46	SMT603xx	Mathematics Elective Course 2		v	v	v					v	8100	3
47	SMT603xx	Mathematics Elective Course 3		v	v	v	v				v	8100	3
48	SMT603xx	Mathematics Elective Course 4		v	v	v					v	8100	3
49	SMT603xx	Mathematics Elective Course 5		v	v	v					v	8100	3
50	SMT603xx	Supplementary Competency Courses		v	v				v	v		8100	3
51	MLK60602	Internship			v	v	v				v	16200	6
52	MLK60605	Community Service			v	v					v	16200	6
53	MKK60301	Research Methodology			v	v					v	8100	3
54	MKK60801	Undergraduate Thesis	v	v	v	v	v	v	v	v	v	21600	8

F. Curriculum Structure and Course Distribution

1. Curriculum Structure

The curriculum structure of the BSM Program consists of seven groups of courses, in accordance with the UNY Curriculum Guidelines 2025. Table 11 presents the distribution of courses and corresponding credit weights (SKS) for the BSM Program.

Table 10. Distribution of Course Groups and Credit Weights in the BSM Program

No.	Course Group	Credits (SKS)
1.	Curriculum Compulsory Courses (Mata Kuliah Wajib Kurikulum – MKWK)	8
2.	University-Compulsory Courses (Mata Kuliah Wajib Universitas – MKWU)	6
3.	Faculty Courses (Mata Kuliah Fakultas – MKF)	4
4.	Core Disciplinary Foundation Courses (Mata Kuliah Pondasi Keilmuan Prodi – MKPKP)	100
5.	Off-Campus Learning Courses (Mata Kuliah Pembelajaran Luar Kampus – MKPLK)	12
6.	Scientific Development Courses (Mata Kuliah Pengembangan Keilmuan – MKPK)	11
7.	Competency Enhancement Courses (Mata Kuliah Tambahan Kompetensi – MKTK)	3
Total Credits		144

Notes

- In Semesters 1 and 2, students may take a maximum study load of 20 credits (SKS) per semester.
- In subsequent semesters, the student's study load is determined based on their Grade Point Average (GPA), with a maximum of 24 credits (SKS).
- During the short semester (inter-semester period), students may take a maximum of 9 credits (SKS).
- Faculty Courses (MKF) are courses that represent the distinctive characteristics of the faculty.
- Core Disciplinary Foundation Courses (MKPKP) are courses that correspond to the core scientific field of the study program.
- Off-Campus Learning Courses (MKPLK) refer to activities conducted outside the university environment, including Field Practice (PK) and Community Service Program (KKN).
- Scientific Development Courses (MKPK) are courses related to the advancement of knowledge within each study program.
- The Undergraduate Final Project (Tugas Akhir Sarjana) may take the form of a thesis, prototype, project, or other equivalent final work, conducted individually or in groups, and carries 8 credits (SKS).
- Competency Enhancement Courses (MKTK) refer to additional skill-based courses offered outside the core curriculum of the study program.
- The maximum study period is twice the standard duration of the curriculum completion time.

The following section presents the list of courses in each group.

1) Curriculum Compulsory Courses (MKWK)

No	Code	Course	Detailed Credit (SKS)				Semester		Prerequisite
			T	P	L	Total	Odd	Even	
1	MWK60201	Islamic Religious Education	2	-	-	2	1		-
	MWK60202	Catholic Religious Education							
	MWK60203	Christian Religious Education							
	MWK60204	Hindu Religious Education							
	MWK60205	Buddhist Religious Education							
	MWK60206	Confucian Religious Education							
2	MWK60207	Civic Education				2	1		-
3	MWK60208	Pancasila Education				2		2	-
4	MWK60209	Bahasa Indonesia				2		2	-
Total						8			

2) University-Compulsory Courses (Mata Kuliah Wajib Universitas – MKWU)

No	Code	Course	Detailed Credit (SKS)				Semester		Prerequisite
			T	P	L	Total	Odd	Even	
1	MWU60201	English for Special Purposes	2	-	-	2	5		-
2	MWU60202	Sports and Physical Fitness	-	2	-	2		2	-
3	MWU60203	Education and Sustainable Development	2	-	-	2	3		-
Total						6			

3) Faculty Courses (Mata Kuliah Fakultas – MKF)

No	Code	Course	Detailed Credit (SKS)				Semester		Prerequisite
			T	P	L	Total	Odd	Even	
1	FMI60201	Mathematical and Natural Sciences Overview	2			2		2	-
2	FMI60202	Basic Statistics	2			2	1		-
Total						4			

4) Off-Campus Learning Courses (Mata Kuliah Pembelajaran Luar Kampus – MKPLK)

No	Code	Course	Detailed Credit (SKS)				Semester		Prerequisite
			T	P	L	Total	Odd	Even	
1	MLK60602	Internship	6			6	7	-	Has completed 110 credits (SKS)
2	MLK60605	Community Service	6			6	7	-	Has completed 110 credits (SKS)
Total						12			

5) Scientific Development Courses (Mata Kuliah Pengembangan Keilmuan – MKPK)

No	Code	Course	Detailed Credit (SKS)				Semester		Prerequisite
			T	P	L	Total	Odd	Even	
1	MKK60301	Research Methodology	3			3	-	6	-
2	MKK60801	Undergraduate Thesis	8			8	-	8	Has completed 110 credits (SKS)
Total						11			

6) Core Disciplinary Foundation Courses (Mata Kuliah Pondasi Keilmuan Prodi – MKPKP)

The core disciplinary foundation courses of the study program comprise a total of 100 credits (SKS), consisting of 85 credits of compulsory courses and 15 credits of elective courses. The following is the list of compulsory and elective courses in the BSM Program.

a. Compulsory Courses

No	Code	Course	Detailed Credit (SKS)				Semester		Prerequisite
			T	P	L	Total	Odd	Even	
1	SMT60201	Number Theory	2	-	-	2	1	-	-
2	SMT60202	Multivariable Calculus	2	-	-	2	3	-	SMT60307
3	SMT60203	Introduction to Real Analysis	2	-	-	2	3	-	SMT60307
4	SMT60204	Introduction to Ring Theory	2	-	-	2	-	4	SMT60310
5	SMT60205	Fuzzy Set Theory	2	-	-	2	-	4	SMT60304
6	SMT60206	Introduction to Topology	2			2	5	-	SMT60314
7	SMT60301	Algorithms and Programming	2	1	-	3	1	-	-
8	SMT60302	Elementary Linear Algebra	3	-	-	3	1	-	-
9	SMT60303	Differential Calculus	3	-	-	3	1	-	-
10	SMT60304	Logic and Set Theory	3	-	-	3	1	-	-
11	SMT60305	Data Analysis and Visualization	2	1	-	3	-	2	FMI60202
12	SMT60306	Analytic Geometry	3	-	-	3	-	2	SMT60302
13	SMT60307	Integral Calculus	3	-	-	3	-	2	SMT60303
14	SMT60308	Discrete Mathematics	3	-	-	3	-	2	SMT60304
15	SMT60309	Computer Applications	2	1	-	3	3	-	SMT60301
16	SMT60310	Introduction to Group Theory	3	-	-	3	3	-	SMT60304 SMT60201
17	SMT60311	Linear Programming	3	-	-	3	3	-	SMT60302
18	SMT60312	Probability Theory	3	-	-	3	3	-	SMT60304
19	SMT60313	Linear Algebra	3	-	-	3	-	4	SMT60302
20	SMT60314	Real Analysis	3	-	-	3	-	4	SMT60203
21	SMT60315	Advanced Calculus	3	-	-	3	-	4	SMT60202
22	SMT60316	Introduction to Mathematical Statistics	3	-	-	3	-	4	SMT60312
23	SMT60317	Partial Differential Equations	3	-	-	3	-	4	SMT60401
24	SMT60318	Complex Analysis	3	-	-	3	5	-	SMT60315
25	SMT60319	Object-Oriented Programming	2	1	-	3	5	-	SMT60301
26	SMT60320	Operations Research	3			3	5	-	SMT60311
27	SMT60321	Graph Theory	3	-	-	3	5	-	SMT60308
28	SMT60322	Numerical Methods	2	1		3	-	6	SMT60313

No	Code	Course	Detailed Credit (SKS)				Semester		Prerequisite
			T	P	L	Total	Odd	Even	
29	SMT60323	Mathematical Modeling	3			3	-	6	SMT60317
30	SMT60401	Differential Equations	4	-	-	4	3	-	SMT60303
Total			80	5		85			

b. Elective Courses (15 credits)

No	Code	Courses	Credit (SKS)				Semester		Prerequisite
			T	P	L	Total	Odd	Even	
Algebra									
1.	SMT60324	Module Theory	3			3	5		SMT60204
2.	SMT60325	Cryptography	3			3	5		SMT60310
3.	SMT60326	Applied Linear Algebra	3			3	5		SMT60313
4.	SMT60327	Coding Theory	3			3		6	SMT60310
5.	SMT60328	Fuzzy Logic	3			3		6	SMT60205
6.	SMT60329	Finite fields and its applications	3			3		6	SMT60204
Analysis and Geometry									
7.	SMT60330	Introduction to Functional Analysis	3			3	5		SMT60203
8.	SMT60331	Fractal Geometry	3			3	5		SMT60313
9.	SMT60332	Introduction to Measure Theory	3			3		6	SMT60214
10.	SMT60333	Differential Geometry	3			3		6	SMT60202
11.	SMT60334	Numerical Analysis	2	1		3		6	SMT60314
Applied Mathematics									
12.	SMT60335	Financial Mathematics	3			3	5		SMT60307
13.	SMT60336	Engineering Mathematics	3			3	5		SMT60202
14.	SMT60337	Initial and Boundary Value Problems	3			3	5		SMT60317
15.	SMT60338	Mathematical Biology	3			3		6	SMT60401
16.	SMT60339	Optimization Theory and Control	3			3		6	SMT60313
17.	SMT60340	Queuing Theory	3			3		6	SMT60312
Computer									
18.	SMT60341	Decision Support Systems	2	1		3	5		SMT60301
19.	SMT60342	Web Design Programming	2	1			5		SMT60301
20.	SMT60343	Digital Image Processing	2	1		3	5		SMT60301
21.	SMT60344	Mobile Device Programming	2	1		3		6	SMT60301
22.	SMT60345	Data Mining	2	1		3		6	SMT60301
23.	SMT60346	Artificial Intelligence	2	1		3		6	SMT60301
24.	SMT60347	Artificial Neural Network	2	1		3		6	SMT60301
Statistics									
25.	SMT60348	Nonparametric Statistics	3			3	5		FMI60202
26.	SMT60349	Experimental Design	3			3	5		SMT60305
27.	SMT60350	Statistical Computing	3			3	5		SMT60305

No	Code	Courses	Credit (SKS)				Semester		Prerequisite
			T	P	L	Total	Odd	Even	
28.	SMT60351	Categorical Data Analysis	3			3		6	SMT60305
29.	SMT60352	Time Series Analysis	3			3		6	SMT60305
30.	SMT60353	Introduction to Multivariate Statistics	3			3		6	SMT60305

7) Additional Competency Courses (MKTK)

Students are required to take 3 credits (SKS) from the Additional Competency Courses (MKTK) offered as follows:

No	Code	Courses	Credit (SKS)				Semester		Prerequisite
			T	P	L	Total	Odd	even	
1	SMT60354	Database	2	1	-	3	-	4	SMT60301
2	SMT60355	Regression Analysis	2	1		3	-	4	SMT60305
3	SMT60356	Creativity, Innovation, and Entrepreneurship	2	1	-	3	-	4	-
4	SMT60357	Transformation Geometry	3	-		3	-	4	SMT60306

2. Course Distribution by Semester

The following is the semester-by-semester course distribution in the BSM program.

SEMESTER I

No	Code	Courses	Credits				Prerequisite
			T	P	L	Total	
1	MWK60201	Islamic Religious Education	2	-	-	2	-
	MWK60202	Catholic Religious Education		-	-		-
	MWK60203	Christian Religious Education		-	-		-
	MWK60204	Hindu Religious Education		-	-		-
	MWK60205	Buddhist Religious Education		-	-		-
	MWK60206	Confucian Religious Education		-	-		-
2	MWK60207	Civic Education	2	-	-	2	-
3	FMI60202	Basic Statistics	2	-	-	2	-
4	SMT60301	Algorithms and Programming	2	1	-	3	-
5	SMT60302	Elementary Linear Algebra	3	-	-	3	-
6	SMT60303	Differential Calculus	3	-	-	3	-
7	SMT60304	Logic and Set Theory	3	-	-	3	-
8	SMT60201	Number Theory	2	-	-	2	-
Total			19	1		20	

SEMESTER II

No	Code	Courses	Credits				Prerequisite
			T	P	L	Total	
1	MWK60208	Pancasila Education	2	-	-	2	-
2	MWK60209	Bahasa Indonesia	2	-	-	2	-

No	Code	Courses	Credits				Prerequisite
			T	P	L	Total	
3	FMI60201	Mathematical and Natural Sciences Overview	2	-	-	2	-
4	MWU60202	Sports and Physical Fitness	1	1	-	2	-
5	SMT60305	Data Analysis and Visualization	2	1	-	3	FMI60202
6	SMT60306	Analytic Geometry	3	-	-	3	SMT60302
7	SMT60307	Integral Calculus	3	-	-	3	SMT60303
8	SMT60308	Discrete Mathematics	3	-	-	3	SMT60304
Total			18	2	-	20	-

SEMESTER III

No	Code	Courses	Credits				Prerequisite
			T	P	L	Total	
1	MWU60203	Education and Sustainable Development	2	-	-	2	-
2	SMT60309	Computer Applications	2	1	-	3	SMT60301
3	SMT60202	Multivariable Calculus	2	-	-	2	SMT60307
4	SMT60203	Introduction to Real Analysis	2	-	-	2	SMT60307
5	SMT60310	Introduction to Group Theory	3	-	-	3	SMT60304
6	SMT60401	Differential Equations	4	-	-	4	SMT60307
7	SMT60311	Linear Programming	3	-	-	3	SMT60302
8	SMT60312	Probability Theory	3	-	-	3	FMI60202
Total			21	1	-	22	-

SEMESTER IV

No	Code	Courses	Credits				Prerequisite
			T	P	L	Total	
1	SMT60313	Linear Algebra	3	-	-	3	SMT60302
2	SMT60314	Real Analysis	3	-	-	3	SMT60203
3	SMT60315	Advanced Calculus	3	-	-	3	SMT60202
4	SMT60316	Introduction to Mathematical Statistics	3	-	-	3	SMT60312
5	SMT60204	Introduction to Ring Theory	2	-	-	2	SMT60310
6	SMT60317	Partial Differential Equations	3	-	-	3	SMT60401
7	SMT60205	Fuzzy Set Theory	2	-	-	2	SMT60304
8	SMT603xx	Supplementary Competency Courses	3	-	-	3	Sesuai MK yg dipilih
Total			22	-	-	22	-

SEMESTER V

No	Code	Courses	Credits				Prerequisite
			T	P	L	Total	
1	MWU60201	English for Special Purposes	2	-	-	2	-
2	SMT60318	Complex Analysis	3	-	-	3	SMT60315
3	SMT60319	Object-Oriented Programming	2	1	-	3	SMT60301
4	SMT60206	Introduction to Topology	2	-	-	2	SMT60314
5	SMT60320	Operations Research	3	-	-	3	SMT60311

No	Code	Courses	Credits				Prerequisite
			T	P	L	Total	
6	SMT60321	Graph Theory	3	-	-	3	SMT60308
7	SMT603xx	Elective Course	3	-	-	3	
8	SMT603xx	Elective Course	3	-	-	3	
Total			21	1	-	22	-

SEMESTER VI

No	Code	Courses	Credits				Prerequisite
			T	P	L	Total	
1	SMT60322	Numerical Methods	2	1		3	SMT60313
2	SMT60323	Mathematical Modeling	3			3	SMT60317
3	MKK60301	Research Methodology	2	1	-	3	-
4	SMT603xx	Elective Course	3	-	-	3	
5	SMT603xx	Elective Course	3	-	-	3	
6	SMT603xx	Elective Course	3	-	-	3	
Total			16	2	-	18	-

SEMESTER VII

No	Code	Courses	Credits				Prerequisite
			T	P	L	Total	
1	MLK60602	Internship	-	-	6	6	Sudah menempuh 100 sks
2	MLK60605	Community Service	-	-	6	6	Sudah menempuh 110 sks
Total			-	-	12	12	-

SEMESTER VIII

No	Code	Courses	Credits				Prerequisite
			T	P	L	Total	
1	MKK60801	Undergraduate Thesis	8	-	-	8	Sudah menempuh 120 sks
Total			8	-	-	8	-

List of Elective Courses (15 credits) (see the previous section)

Notes:

- In Semester 5, students take 2 elective courses (6 credits) within the same specialization area.
- In Semester 6, students may take 3 elective courses (9 credits) from two different specialization areas, where one of these areas must be the same as the specialization chosen in Semester 5.

List of Additional Competency Courses (MKTK)

Students take 1 course (3 credits) from the Additional Competency Courses (MKTK) offered as follows:

No	Code	Courses	Credits				semester		Prerequisite
			T	P	L	Total	Odd	Even	
1	SMT60354	Database	2	1	-	3	-	4	SMT60301
2	SMT60355	Regression Analysis	2	1		3	-	4	SMT60305
3	SMT60356	Creativity, Innovation, and Entrepreneurship	2	1	-	3	-	4	-
4	SMT60357	Transformation Geometry	3	-		3	-	4	SMT60306

G. Learning Process

The learning process in the BSM Program is carried out in accordance with the National Higher Education Standards, which cover the characteristics of the learning process, planning of the learning process, implementation of the learning process, and student workload. The characteristics of the learning process include interactive, holistic, integrative, scientific, contextual, thematic, effective, collaborative, and student-centred nature. The learning process is planned for each course and presented in a semester learning plan (RPS) developed by lecturers, either independently or in a group of experts.

The learning process occurs through interaction among lecturers, students, and learning resources within a specific learning environment. The learning process is carried out using various methods: group discussions, simulations, case studies, collaborative learning, cooperative learning, project-based learning, problem-based learning, and other methods that effectively facilitate the achievement of Graduate/Program Learning Outcomes . Each course may use one or a combination of several learning methods and be accommodated in a learning format in the form of: (1) lectures, (2) responses and tutorials, (3) seminars, (4) practicums or field practice, (5) internships, (6) research, (7) humanitarian projects, (8) entrepreneurship, (9) student exchanges, and/or (10) other forms of community service. These forms of learning accommodate students' interests and potential for self-development, within their freedom to learn, to achieve the desired learning outcomes.

Learning in the BSM Program has benefited from technological advances. Several courses have been developed as online lectures that can be used either fully or in a blended learning format and can be accessed through the Learning Management System (BeSmart UNY) at <http://besmart.uny.ac.id/v2/>. Students are also required to utilise technology through various available applications.

The student workload is expressed in credit hours (SKS). One SKS of lecture activity is equivalent to 45 hours per semester. This is equivalent to 170 (one hundred and seventy) minutes of learning activities per week per semester: 50 minutes of face-

to-face teaching, 60 minutes of structured assignments, and 60 minutes of independent study. Each course has a minimum weight of 1 (one) SKS. A semester is a unit of time for effective learning activities lasting 16 (sixteen) weeks.

The learning process aims to fulfil the programme's competency outcomes in accordance with the Graduate/Program Learning Outcomes and Course Learning Outcomes. These competency outcomes require the implementation of a learning process with a student-centred system (student learning centre). Learning emphasises the strengthening of personal, social, pedagogical, and professional competencies.

Learning can be conducted through face-to-face meetings, including structured e-learning assignments, independent assignments, and other equivalent activities; seminars; practical work and research; and community service. Learning can also be conducted through blended learning or a full e-learning model. There are a total of 16 meetings per semester. Students are required to attend at least 75% of the face-to-face sessions held.

The implementation of learning basically involves three stages: the preliminary stage, core activities/presentation, and conclusion. In line with the principle of mastery learning, learning activities are a process of facilitating students to gain learning experiences and mastery in accordance with predetermined competency outcomes. Therefore, a contextual approach with activities that encourage students to be active, innovative, creative, inspiring, and build a pleasant atmosphere is a learning process that continues to be developed. Character, national values, and entrepreneurial spirit are integral parts of building the meaning of learning. Through the learning process that has been developed, student success is not only determined by hard skills or intellectual abilities (grade point average), but also by soft skills, such as cognitive abilities, character, personality, and morality.

H. Assessment

Learning assessment is an important part of the curriculum for determining students' success in achieving predetermined learning outcomes. In accordance with Permendikbud Number 53 of 2023 on the Higher Education Quality Assurance System regarding learning assessment standards, the BSM Program implements an assessment process based on the principles of education, authenticity, objectivity, accountability, and transparency. Learning assessment encompasses two aspects: process assessment and learning outcome assessment. Process assessment is used to understand how students engage in the lecture process, including aspects of personality and character. Outcome assessment is intended to provide an overview of competency attainment (PLO completion) after participating in the learning process.

Process assessment is used to observe student engagement in lectures, covering soft skills such as participation in lecture activities, the ability to articulate ideas, and the ability to foster responsibility and independence, foster a spirit of solidarity and cooperation, and encourage increased student motivation. Process assessment is conducted through observation, peer assessment, and portfolios. This assessment

is conducted throughout the course as one of the components that determine the final grade.

Outcome assessment evaluates students' ability to achieve the competencies that constitute the learning outcomes. Outcome assessment is conducted through competency tests for each sub-competency or sub-CPMK, mid-semester exams, practical exams, and end-of-semester exams. Outcome assessment methods include written exams, essay/paper writing, oral exams, practical exams, and portfolios.

Various assessment techniques can be used, including observation, participation, performance, written tests, oral tests, and questionnaires. Learning process assessment instruments can take the form of rubrics and/or portfolios. The final assessment result is an integration of the various assessment techniques and instruments used.

Measurement and assessment should target as many domains of competence as possible, developed in each course, including knowledge, attitudes, and skills. Assessment is carried out through various methods, both tests and non-tests, to ensure results are authentic and aligned with the course's competency or learning outcomes, including the option to conduct non-test assessments that cover the 4Ps (Performance, Product, Project, and Portfolio). In accordance with *SN-Dikti*, measurement/assessment at all levels of higher education must consider aspects of validity, reliability, comprehensiveness, character, and sustainability.

Reporting of assessments takes the form of qualifications of student success in completing a course, expressed in a range of numbers and letters in accordance with applicable academic regulations. Students with high academic achievement have a semester grade point average (GPA) greater than 3.50 (three point five zero) and meet academic ethics standards.

Notes:

PLO measurement is carried out using an outcome-based assessment (OBA) approach to ensure that each student achieves the specified competencies.

- Each course must have LOs that contribute to specific PLOs.
- Each LO must have an assessment that is measurable and relevant to the PLO.
- The form of assessment must be varied according to the level of competency (attitude, knowledge, general skills, specific skills).
- Cumulative evaluation is carried out after students have completed all courses related to a specific PLO.
- Methods used:
 - Student Portfolio → Assessing student learning outcomes from assignments, projects, and reports during their studies.
 - Final Competency (Capstone Project, Final Project, or Comprehensive Examination) → Students work on a major project that reflects their mastery of the PLO.

- Tracer Study and User Satisfaction Survey → Evaluation of PLOs after students graduate, involving industry and academia.
- PLO (Programme Learning Outcomes) scoring is done by converting individual student achievements in relevant courses.

$$\text{PLO Score} = \sum \frac{N_{\text{Course grade}} \times \text{contribution weight}}{\sum \text{contribution weight}}$$

Example: LO contribution weight in PLO

Course	PLO	LO	Cognitive					Participation		PLO (%)	Contribution Weight
			Attendance (%)	Quiz (%)	Tasks (%)	Midterm Exam (%)	Final Exam (%)	Case Study (%)	Team Based Project (%)		
Course1	PLO-1	LO01	10							60	100
		LO02					20	30			
	PLO-2	LO03					20		40		
		LO04		10		10					
Course2	PLO-3	LO05	10						40	100	
		LO06					10				
		LO07				10	10				
	PLO-4	LO08					10		20		
		LO09				10					
	PLO-5	LO10					10		20		
LO11							10				

Example

No	Jenis Penilaian	Bobot (%)	CPMK 1	CPMK 2	CPMK 3
1	Partisipasi Kelas	10	Lembar penilaian partisipasi kelas (setiap pertemuan): a. Kehadiran b. Kedisiplinan c. Partisipasi kelas d. Inisiatif	-	-
2	Kepemimpinan, kedisiplinan, kemandirian, profesionalitas, mengembangkan jejaring	5	Lembar Observasi Kepemimpinan, kedisiplinan, kemandirian, profesionalitas, mengembangkan jejaring (pertemuan ke 3, (9-10), (12-16)	-	-
2	Penugasan Mandiri	5	-	Penugasan mandiri 1 (minggu ke 4); 5%	
3	Penugasan Mandiri Studi Kasus	10	-	1. Penugasan Mandiri Studi Kasus 1 (minggu ke 2); 5% 2. Penugasan Mandiri studi kasus 2 (minggu ke 11); 5%	-
4	Penugasan Kelompok Studi Kasus	30	-	1. Penugasan kelompok studi kasus-PBL 1 (minggu ke 3); 5% 2. Tugas kelompok studi kasus 2 (minggu ke 6-7) 10% 3. Tugas kelompok studi kasus 3 (minggu ke 8) 10% 4. Tugas kelompok studi kasus 4 (minggu ke 9-10); 5%	-
5	Kuis-tes tulis	5	-	Kuis 1 (minggu ke. 5); 5%	-
6	Group Project	20	-	-	Penugasan Project (minggu ke 12-16); 20%
7	Ujian Akhir Semester	15	-	Tes Tertulis; 10%	Tes Tertulis; 5%

I. Curriculum Quality Assurance

The implemented quality assurance system is outcome-based, serving as a monitoring and evaluation mechanism to ensure continuous quality improvement and the achievement of the standards and learning outcomes set by the educational program. The Outcome-Based Quality Assurance System ensures that standards and

learning outcomes are established at the outset and that their systematic and sustainable achievement and enhancement are achieved.

In line with the implementation of the Internal Quality Assurance System for Higher Education, curriculum quality assurance in the BSM Program is conducted in accordance with the Quality Assurance System applied at the Faculty of Mathematics and Natural Sciences level. It is implemented through a quality assurance cycle consisting of establishment, implementation, evaluation, control, and improvement (PPEPP). The following are the steps for curriculum quality assurance in alignment with the higher education quality assurance system:

1. Curriculum Establishment

- The curriculum is established by the university leadership every four to five years, by determining the graduate profiles, program objectives, Graduate/Program Learning Outcomes (PLO), courses with their corresponding credit weights, and an integrated curriculum structure.
- The establishment process is carried out through the formulation and validation of standard documents, which may be supplemented with guidelines, manuals, standard operating procedures (SOP/POB), and relevant forms.

2. Curriculum Implementation

- Curriculum implementation refers to the execution of the established academic standards.
- It is carried out through the learning process, ensuring the achievement of Graduate/Program Learning Outcomes (PLO) — both at the program level (PLO), the course level (Course Learning Outcomes – CPMK), and the sub-course level (Sub-CPMK) within each learning activity.
- The implementation of the curriculum is guided by the Semester Learning Plan (*Rencana Pembelajaran Semester – RPS*), prepared by individual lecturers or teaching teams, with careful attention to the alignment between PLO, CPMK, and Sub-CPMK.
- The Sub-CPMK and CPMK at the course level must directly support the achievement of the PLOs assigned to each course.

3. Curriculum Evaluation

- Curriculum evaluation is conducted to assess compliance with the established academic standards.
- Formative evaluation is carried out to monitor the achievement of PLOs. This includes the evaluation of CPMK and Sub-CPMK, which are determined at the beginning of each semester by the lecturer or teaching team in coordination with the study program.
- Evaluation is also conducted on learning methods, instructional approaches, assessment techniques, course learning plan (RPS), and other supporting learning materials.
- Summative evaluation is conducted periodically every four to five years, involving both internal and external stakeholders, and reviewed by disciplinary experts, industry representatives, and professional associations,

ensuring alignment with the latest developments in science, technology, and societal needs.

4. Curriculum Control

- Curriculum control is carried out each semester using performance indicators derived from the measurement of PLO achievement.
- The control process is conducted by the Study Program and monitored and supported by the university's quality assurance unit or institution.

5. Curriculum Improvement

- Curriculum improvement is based on the results of both formative and summative evaluations conducted at the program and institutional levels.

6. Course Description

1. Core Curriculum Courses Group

1) MWK60201 Islamic Education

Prerequisite course: –

The Islamic Religious Education course is a compulsory subject for all Muslim students across all study programs at the university. This course is designed to strengthen students' faith and devotion to Allah SWT, cultivate noble character (moral integrity), and broaden their knowledge and understanding of the religious life. It aims to shape Muslim students who possess virtuous character, think philosophically, act rationally and dynamically, and have a broad perspective, while emphasizing the importance of fostering harmony among fellow human beings—both within the same religion and with followers of other religions.

MWK60202 Catholic Religious Education

Prerequisite courses: -

The Catholic Religious Education course is mandatory for all Catholic students across all study programs and carries 3 credits. This course is designed to strengthen faith and piety in God Almighty and broaden religious perspectives. This course aims to develop students with noble character, philosophical thinking, rational and dynamic attitudes, and broad perspectives, while emphasizing the need for respect within one community and harmonious relationships between religious communities. Lectures are conducted through lectures, dialogues, and paper presentations. Evaluation is conducted through written tests, assignments, reports, and presentations.

MWK60203 Protestant Christian Religious Education

Prerequisite courses: -

The Christian Religious Education course is mandatory for all Christian students across all study programs and carries 3 credits. This course is designed to strengthen faith and piety in God Almighty and broaden religious perspectives. This course aims to develop students with noble character, philosophical thinking, rational and dynamic attitudes, and broad perspectives, while emphasizing the need for respect within one community and harmonious relationships between religious communities. Lectures are conducted through lectures, dialogues, and paper presentations. Evaluation is conducted through written tests, assignments, reports, and presentations.

MWK60204 Hindu Religious Education

Prerequisite courses: -

Religion, as understood by most Hindus, is not a theory to be memorized, nor is it merely dogma, nor are words empty of meaning. Religion is a set of values that, if practised, are of great benefit to the individual and others. The Hindu Religious Education course is mandatory for all Hindu students across all study programs and carries 3 credits. This course is designed to strengthen faith and piety in God Almighty and broaden religious perspectives. This will develop students with noble character, philosophical thinking, rational and dynamic attitudes, and broad perspectives, while emphasizing the need for respect within one's community and harmonious relationships between religious communities. Lectures are conducted through lectures, dialogues, and presentations. Evaluation is carried out through written assignments, reports, and presentations.

MWK60205 Buddhist Religious Education

Prerequisite courses: -

The Buddhist Religious Education course is mandatory for all Buddhist students across all study programs and carries 3 credit units. This course is designed to strengthen faith and piety in God Almighty and broaden religious perspectives. This course aims to develop students with noble character, philosophical thinking, rational and dynamic attitudes, and broad perspectives, while emphasizing the need for respect within one community and harmonious relationships between religious communities. Lectures are conducted through lectures, dialogues, and paper presentations. Evaluation is conducted through written tests, assignments, reports, and presentations.

MWK60206 Confucian Religious Education

Prerequisite courses: –

The Confucian Religious Education course covers the urgency of religion in daily life with appropriate attitudes. It includes an understanding of Confucian legal sources, knowledge of Confucian history, the ability to practice the Sacred Way taught in the Great Learning (Tai Hak), and the role of Confucianism in the development of science and technology.

MWK60207 Civic Education

Prerequisite courses: –

Civic Education is a compulsory course for all undergraduate (S1) and diploma (D3) students, with a weight of 2 credits. This course equips students with basic knowledge and skills regarding the relationship between citizens and the state, as well as preliminary education on national defense so that they become citizens who can be relied upon by the nation and state. The course covers: 1) Rights and obligations of citizens, 2) Introductory national defense education, 3) Indonesian democracy, 4) Human Rights, 5) Wawasan Nusantara as Indonesia's geopolitics, 6) National Resilience as Indonesia's geostrategy, and 7) National politics and strategy as the implementation of Indonesia's geostrategy.

MWK60208 Pancasila

Prerequisite courses: –

This course discusses the foundations and objectives of Pancasila Education, Pancasila in the context of Indonesia's national struggle history, 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.

MWK60209 Indonesian Language

Prerequisite courses: –

This course aims to equip students with competencies in using the Indonesian language for writing scientific works. Topics include the historical development of Indonesian, the status and functions of Indonesian, writing conventions, paragraph development, paragraph types, reasoning in paragraphs, types of scientific writing, formatting scientific papers, writing references, and creating bibliographies. Learning activities involve lectures, discussions, and structured assignments. Evaluation is conducted through written tests and structured assignments.

2. University Core Courses

1) MWU60202 Sports and Physical Fitness

The course description follows the University's guidelines.

2) MWU60203 Education and Sustainable Development

The course description follows the University's guidelines.

3) MWU60201 English for Specific Purposes

Prerequisite courses: -

This course develops four English language skills: listening, reading, speaking, and writing. The course includes English grammar, oral communication in mathematics, written mathematical communication, listening to mathematics-related videos, presenting mathematics videos, translating mathematical texts from English to Indonesian and vice versa, and rewriting mathematical articles. In addition, students gain knowledge of TOEFL preparation and practice exercises.

3. Faculty Core Courses (MKF)

1) FMI60201 Scientific Perspectives in Mathematics and Natural Sciences

Prerequisite courses: -

This course discusses the fundamental scientific methods used in mathematics and the natural sciences for problem-solving and for drawing conclusions based on sound logical reasoning (mathematical logic). The course also introduces fundamental concepts of science and their recent developments.

2) FMI60202 Basic Statistic

Prerequisite courses: -

This course discusses the fundamental scientific methods used in mathematics and natural sciences for problem solving and techniques for drawing conclusions based on correct logical reasoning (mathematical logic). The course also introduces fundamental concepts of science and their recent developments.

4. Foundation Courses of the Study Program

1) SMT60301 Algorithms and Programming

Prerequisite courses: -

This course introduces computer programming as a problem-solving tool. Topics include problem solving, algorithm design and representation, and program development using the Python programming language. The course covers program structure in Python, input–output commands, identifiers, data types, variables, arithmetic and logical operations, control flow and decision structures, loops, advanced data types (string, list, tuple, set, dictionary), functions and modules, file handling and exception handling, and the use of modules for data visualization.

2) SMT60302 Elementary Linear Algebra

Prerequisite courses: -None

This course discusses matrices and matrix operations, matrix arithmetic rules, types of matrices, elementary matrices, methods for finding matrix inverses, systems of linear equations (SLE),

Gaussian elimination and Gauss–Jordan elimination, determinants and their properties, determinant calculation using row reduction, cofactor expansion and Cramer’s rule, relationships between homogeneous systems, matrix inverses and determinants, applications of matrix inverses in cryptography, vectors, vector norms, dot products, projections, cross products in R^2 and R^3 , and Euclidean spaces.

3) SMT60303 Differential Calculus

Prerequisite courses: -

This course is compulsory for all students. It covers real number systems, coordinate systems, functions, limits and continuity of functions, derivatives, applications of derivatives in optimization problems, limits at infinity, infinite limits, advanced graph sketching, and the mean value theorem.

4) SMT60304 Logic and Sets

Prerequisite courses: -

This course is mandatory for all students. It covers mathematical reasoning, including propositional logic, deduction of information, validity of arguments, proof methods, and predicate logic. It also discusses the concepts and properties of sets, relations, and functions.

5) SMT60201 Number Theory

Prerequisite courses: -

This course covers mathematical induction, divisibility, greatest common divisor (GCD), least common multiple (LCM), number bases, linear Diophantine equations, prime numbers, unique factorization, congruences, linear congruences, remainder theorem, Fermat’s theorem, Wilson’s theorem, Euler’s theorem, arithmetic functions, primitive roots and indices, and quadratic residues.

6) SMT60305 Data Analysis and Visualization

Prerequisite courses: FMI60202 Basic Statistics

This course introduces R programming and statistical analysis, including chi-square tests for categorical data (univariate and bivariate), simple and multiple linear regression, one-way and two-way analysis of variance, data manipulation, merging datasets, data cleaning, visualization of categorical data, continuous data visualization, combined visualization of categorical and continuous variables, and map visualization.

7) SMT60306 Analytic Geometry

Prerequisite courses: SMT60302 Elementary Linear Algebra

This course studies mathematical reasoning and proof related to geometric elements such as points, lines, planes, and solid geometric shapes, and examines plane and spatial geometry using algebraic approaches. Analytical discussions in two dimensions include coordinate systems, lines, circles, and conic sections. Three-dimensional topics include coordinate systems in three-dimensional space, planes, lines, and spheres.

8) SMT60307 Integral Calculus

Prerequisite courses: SMT60303 Differential Calculus

This course examines indefinite and definite integrals, the fundamental theorem of calculus, applications of definite integrals to compute volumes and arc lengths, transcendental functions, integration techniques, indeterminate forms, and improper integrals.

9) SMT60308 Discrete Mathematics

Prerequisite courses: SMT60304 Logic and Sets

This course develops logical and mathematical thinking for solving discrete problems. Topics include the inclusion–exclusion principle, basic counting techniques (addition and multiplication rules), permutations and combinations, the pigeonhole principle, recurrence relations, generating functions, fundamentals of graph theory, and Boolean algebra with its applications.

10) SMT60309 Computer Applications

Prerequisite courses: SMT60301 Algorithms and Programming

This course introduces mathematical software, both commercial and open-source, compares their features, and demonstrates their use for solving mathematical problems and preparing mathematical documents. Students learn to use several open-source tools, including Euler Math Toolbox (EMT), Octave, Scilab, Maxima, GeoGebra, and LaTeX.

11) SMT60202 Multivariable Calculus

Prerequisite courses: SMT60307 Integral Calculus

This course discusses the concepts of derivatives of multivariable functions and multiple integrals along with their applications. Topics include functions of two variables, limits and continuity of functions of two variables, differentiability and directional derivatives, maximum and minimum values, the Lagrange multiplier method, double integrals in Cartesian and polar coordinates, volume, and surface area.

12) SMT60203 Introduction to Real Analysis

Prerequisite courses: SMT60307 Integral Calculus

This course studies the real number system, sequences and series, and functions. It begins with a review of functions, proof principles, mathematical induction, and sets. The real number system includes rational and irrational numbers, the algebraic properties of \mathbb{R} , the order properties of \mathbb{R} , and the completeness properties of \mathbb{R} . Topics on sequences and series include limits of sequences, monotone sequences, subsequences, the Cauchy criterion, and properties of series. Basic topology concepts are also introduced, including open sets, closed sets, and compact sets. The course concludes with discussions of the limits of functions, the continuity of functions, and uniform continuity.

13) SMT60310 Introduction to Group Theory

Prerequisite courses: SMT60304 Logic and Sets, SMT60201 Number Theory

This course discusses the concepts and properties of groups, subgroups, permutation groups, cyclic groups, cosets, Lagrange's theorem, normal subgroups, quotient groups, group homomorphisms, and several applications of group theory.

14) SMT60401 Differential Equations

Prerequisite courses: SMT60307 Integral Calculus

This course discusses definitions and solutions of differential equations. It covers exact solutions of first-order differential equations, including separation of variables, integrating factors, linear equations, Bernoulli equations, and special transformations. The course also discusses second-order ordinary differential equations, both homogeneous and nonhomogeneous. Methods for solving nonhomogeneous equations include the method of undetermined coefficients, the method of variation of parameters, and the Cauchy–Euler method. Applications of first- and second-order differential equations in real-life problems are also discussed. The course concludes with systems of differential equations, their solutions, and their applications.

15) SMT60311 Linear Programming

Prerequisite courses: SMT60302 Elementary Linear Algebra

This course discusses modelling real-world problems into linear programming models. Topics include convex sets, feasible regions, extreme points, and optimal solutions in hyperplanes. Solutions to linear programming problems are studied using graphical methods and the simplex method. The course also covers the two-phase simplex method, duality theory, sensitivity analysis, special cases of linear programming, integer linear programming, and transportation problems.

16) SMT60312 Probability Theory

Prerequisite courses: SMT60304 Logic and Sets

This course studies fundamental concepts in probability theory, including combinatorics, definitions of probability, random variables and their distributions, properties of random variables, joint distributions of random variables, functions of random variables, sampling distributions, and the central limit theorem.

17) SMT60313 Linear Algebra

Prerequisite courses: SMT60302 Elementary Linear Algebra

This course covers general vector spaces, vector subspaces, linear combinations, spanning sets, linear independence, basis, dimension, row and column spaces, inner product spaces, vector length and distance, orthogonal and orthonormal bases, the Gram–Schmidt process, vector coordinates and change of basis, linear transformations, kernel and range, rank and nullity, matrix representations of linear transformations, similarity, eigenvalues and eigenvectors, and matrix diagonalization along with their properties.

18) SMT60314 Real Analysis

Prerequisite courses: SMT60203 Introduction to Real Analysis

This course studies derivatives, sequences and series of functions, and the Riemann integral. Topics include the definition of derivatives, the mean value theorem, properties of differentiable functions, and continuous functions that are not differentiable. The course also discusses pointwise and uniform convergence of sequences of functions, the relationship between uniform convergence and differentiation, and function series, including power and Taylor series. The final part discusses the definition of the Riemann integral, integrals of discontinuous functions, properties of integrals, the fundamental theorem of calculus, and Lebesgue's criterion for Riemann integrability.

19) SMT60315 Advanced Calculus

Prerequisite courses: SMT60202 Multivariable Calculus

This course covers sequences and series, line integrals, surface integrals, Gamma functions, and Beta functions. Topics include infinite sequences and series, convergence and divergence tests, Taylor and Maclaurin series, line integrals, surface integrals and their relationships with Gauss' Divergence Theorem and Stokes' Theorem, along with their applications.

20) SMT60316 Introduction to Mathematical Statistics

Prerequisite courses: SMT60312 Probability Theory

This course discusses point estimation and the properties of estimators, confidence intervals, pivotal quantity methods, general methods for interval estimation, confidence intervals for large samples, confidence intervals for small samples, Bayesian interval estimation, and concepts of hypothesis testing.

21) SMT60204 Introduction to Ring Theory

Prerequisite courses: SMT60310 Introduction to Group Theory

This course discusses the concepts and properties of rings, subrings, integral domains, fields, ring characteristics, ideals, quotient rings, ring homomorphisms, polynomial rings, Euclidean domains, unique factorization domains, and finite fields.

22) SMT60317 Partial Differential Equations

Prerequisite courses: SMT60401 Differential Equations

This course discusses basic terminology of partial differential equations (PDEs), first-order PDEs, the transport equation, classification of second-order PDEs, modelling of wave equations, D'Alembert solutions, modelling of heat equations, separation of variables techniques, and solutions of the heat equation.

23) SMT60205 Fuzzy Set Theory

Prerequisite courses: SMT60304 Logic and Sets

This course covers basic concepts of fuzzy sets, fuzzy operations, alpha-cuts of fuzzy sets, fuzzy relations, and basic fuzzy logic. Applications include decision making, prediction, classification, and control systems.

24) SMT60318 Complex Analysis

Prerequisite courses: SMT60315 Advanced Calculus

This course discusses the complex number system, including addition and multiplication operations and their algebraic properties. Using concepts such as conjugates, moduli, and the exponential forms of complex numbers, this module studies problems involving the roots of complex numbers and polynomial equations. Based on the concept of neighborhoods in the complex plane, limits, continuity, and differentiability of complex-valued functions are discussed. Analytic functions are studied using the Cauchy–Riemann conditions. The concept of contour integrals is introduced as an extension of the Riemann integral. The Cauchy–Goursat theorem and Cauchy integral theorem are used to solve problems involving integrals and to expand complex functions into Taylor and Laurent series. The course concludes with the study of residues and poles of singular points and their applications.

25) SMT60319 Object-Oriented Programming

Prerequisite courses: SMT60301 Algorithms and Programming

This course discusses the object-oriented approach in computer programming. Fundamental concepts covered include the object-oriented programming paradigm, classes, objects and instances, inheritance, encapsulation, polymorphism, exception handling, input streams, and the development of graphical user interfaces (GUI).

26) SMT60206 Introduction to Topology

Prerequisite courses: SMT60314 Real Analysis

This course begins with topology in the real number system. It introduces open sets defined by open intervals and discusses the continuity of functions with respect to open sets and the preimages of functions. The course then discusses general topological spaces, their properties, and various types of sets in topological spaces.

27) SMT60320 Operations Research

Prerequisite courses: SMT60311 Linear Programming

This course discusses optimisation and operations, as well as research models. Topics include transportation and transshipment problems (scenarios, models, and solution techniques), assignment problems and the travelling salesman problem. The course also covers algorithms, including shortest path, longest path (PERT/CPM), minimum spanning tree, maximum flow, and dynamic programming techniques.

28) SMT60321 Graph Theory

Prerequisite courses: SMT60308 Discrete Mathematics

This course covers the concepts of graph theory, including types of graphs, connected graphs, connectivity, trees, spanning trees, algorithms for determining minimum spanning trees, graph traversability, graph planarity and techniques for determining planarity, graph coloring, and several applications of graph theory.

29) SMT60322 Numerical Methods

Prerequisite courses: SMT60313 Linear Algebra

This course discusses numerical approximation errors, numerical solutions of systems of linear equations, numerical approximation of roots of nonlinear equations, interpolation, numerical differentiation and integration, and numerical solutions of ordinary differential equations (initial value problems). Practical sessions using computer software such as Euler Math Toolbox, Octave, SCILAB, or MATLAB are included to implement numerical algorithms and solve mathematical problems computationally.

30) SMT60323 Mathematical Modeling

Prerequisite courses: SMT60317 Partial Differential Equations

This course discusses how real-world problems can be represented in mathematical models and how the results can be interpreted. Topics include modelling processes, model examples, and modelling projects. Models studied include continuous models using differential equations, such as population growth, Newton's law of cooling, and oscillatory motion in spring–mass systems without damping, as well as discrete models using difference equations, such as population growth and economic models.

31) SMT60324 Module Theory

Prerequisite courses: SMT60204 Introduction to Ring Theory

This course covers the concepts and properties of modules, submodules, module homomorphisms, quotient modules, direct sums of modules, finitely generated modules, torsion modules, free modules, simple modules, and Artinian modules.

32) SMT60325 Cryptography

Prerequisite courses: SMT60310 Introduction to Group Theory

This course discusses the fundamentals of cryptography, including classical cryptography, Data Encryption Standard (DES), Advanced Encryption Standard (AES), public-key cryptography, RSA, ElGamal, discrete logarithms, and email and internet security.

33) SMT60326 Applied Linear Algebra

Prerequisite courses: SMT60313 Linear Algebra

This course discusses applications of systems of linear equations in GPS problems and iterative methods, applications of matrices in Markov chains, population growth and digital image

compression, applications of eigenvalues in systems of linear differential equations, singular value decomposition, and applications in statistical problems.

34) SMT60327 Coding Theory

Prerequisite courses: SMT60310 Introduction to Group Theory

This course covers the basic concepts of error-correcting codes, including finite fields, vector spaces over finite fields, ideals of rings, linear codes, generator matrices, dual codes, Hamming codes, perfect codes, parity-check matrices, single-error correcting decoding, standard array decoding, and cyclic codes.

35) SMT60328 Fuzzy Logic

Prerequisite courses: SMT60205 Fuzzy Set Theory

This course discusses fuzzy rule bases, fuzzy inference systems, fuzzification, defuzzification, and their applications in prediction, classification, decision-making, and control systems.

36) SMT60329 Finite Fields and Their Applications

Prerequisite courses: SMT60204 Introduction to Ring Theory

This course discusses finite fields, cyclotomic cosets, polynomials over finite fields, minimal polynomials, polynomial factorization, feedback shift register sequences, de Bruijn sequences, and their applications.

37) SMT60330 Introduction to Functional Analysis

Prerequisite courses: SMT60203 Introduction to Real Analysis

This course studies metric spaces, normed spaces (Banach spaces), operators, and inner product spaces (Hilbert spaces). Topics include definitions of metric spaces, open and closed sets, neighbourhoods, convergent sequences and Cauchy sequences. The course then discusses normed spaces, vector spaces, linear operators, linear functionals, and the Hahn–Banach theorem. Finally, inner product spaces are discussed, including orthogonal and orthonormal systems and representation of functionals in Hilbert spaces.

38) SMT60331 Fractal Geometry

Prerequisite courses: SMT60313 Linear Algebra

This course introduces the basic concepts of fractal geometry through visual and applied approaches. Applications of fractals are demonstrated through computer visualizations such as patterns in nature (leaves, clouds, coastlines), digital art, population modelling, and image compression. Students study fractal structures characterized by self-similarity, infinite complexity within finite scales, and non-integer dimensions. Topics include classical fractals (Cantor set, Sierpinski triangle, Koch curve), iterated function systems (IFS), L-systems, and simple dynamics of complex numbers (Mandelbrot and Julia sets). Students use visualization tools such as GeoGebra, Desmos, Python (matplotlib or turtle graphics), or other interactive software.

39) SMT60332 Introduction to Measure Theory

Prerequisite courses: SMT60314 Real Analysis

This course begins with the Riemann integral of real-valued functions and examples of functions that are not Riemann integrable as motivation for introducing the Lebesgue integral. It then discusses sigma-algebras, measures of sets, measurable functions, and the definition of the Lebesgue integral using characteristic functions. Properties of the Lebesgue integral are used to solve problems related to integration.

40) SMT60333 Differential Geometry

Prerequisite courses: SMT60202 Multivariable Calculus

This course studies geometric configurations in the form of curves and surfaces. Their properties are analyzed using differential and integral techniques. Topics include arc length, parameterization, curvature, curves in the plane and in three-dimensional space, regular surfaces, the geometry of the Gauss map, and intrinsic geometry of surfaces.

41) SMT60334 Numerical Analysis

Prerequisite courses: SMT60314 Real Analysis

This course discusses the theoretical foundations of numerical methods used in solving mathematical problems. The focus is on convergence analysis, stability, error analysis, and efficiency of numerical algorithms. Students learn mathematical principles that ensure the reliability of numerical methods in scientific computing.

42) SMT60335 Financial Mathematics

Prerequisite courses: SMT60307 Integral Calculus

This course discusses nominal and effective interest rates, general and special annuities, amortization, yield, and bonds.

43) SMT60336 Engineering Mathematics

Prerequisite courses: SMT60202 Multivariable Calculus

This course covers applications of systems of differential equations, phase planes, stability, power series solutions of differential equations, Bessel functions, and Laplace transforms.

44) SMT60337 Initial and Boundary Value Problems

Prerequisite courses: SMT60317 Partial Differential Equations

This course discusses Dirichlet, Neumann, and Robin boundary conditions, Fourier series, Fourier integrals, Fourier transforms, non-homogeneous boundary-value problems, and numerical methods for solving initial- and boundary-value problems.

45) SMT60338 Mathematical Biology

Prerequisite courses: SMT60401 Differential Equations

This course discusses mathematical modelling in biology, particularly epidemiology. Topics include constructing epidemic models, determining equilibrium points, analyzing their stability, and simulating model solutions using relevant software.

46) SMT60339 Optimization and Control Theory

Prerequisite courses: SMT60311 Linear Programming

This course studies nonlinear programming and optimal control. Topics include Newton's method for optimization (single-variable and multivariable), unconstrained optimization, constrained optimization (equality and inequality constraints), quadratic programming, interior-point methods, Hessian matrices, dynamic systems, shooting methods, initial and boundary value problems, discretization methods, and Hermite–Simpson methods.

47) SMT60340 Queueing Theory

Prerequisite courses: SMT60312 Probability Theory

This course discusses queueing systems and the development of queueing theory, Kendall–Lee notation, Poisson and exponential distributions in queueing models, performance measures of queueing systems, M/M/1 and M/M/c models, special queueing cases (supermarkets, balking, reneging, jockeying), and simulation.

48) SMT60341 Decision Support Systems

Prerequisite courses: SMT60301 Algorithms and Programming

This course discusses decision support systems and their applications. Students learn to develop solution models using decision support techniques such as Simple Additive Weighting (SAW), Analytical Hierarchy Process (AHP), TOPSIS, PROMETHEE, and other Multi-Criteria Decision Making (MCDM) methods.

49) SMT60342 Web Design Programming

Prerequisite courses: SMT60301 Algorithms and Programming

This course introduces the development of web applications using static and dynamic content through HTML, CSS, JavaScript, PHP-MySQL, and content management systems (CMS). It also discusses principles of information system development.

50) SMT60343 Digital Image Processing

Prerequisite courses: SMT60301 Algorithms and Programming

This course covers fundamental concepts of digital image processing and its applications including image representation, arithmetic and geometric operations on images, filtering and convolution, Fourier transform in image processing, image histograms, image segmentation, image compression and decompression, steganography, watermarking, and pattern recognition.

51) SMT60344 Mobile Application Programming

Prerequisite courses: SMT60301 Algorithms and Programming

This course discusses the basics of mobile application programming including native and block-based programming approaches, UI/UX design, database management, interaction with external environments, and packaging and publishing mobile applications.

52) SMT60345 Data Mining

Prerequisite courses: SMT60301 Algorithms and Programming

This course discusses the concepts of data mining and data warehouses, the data mining life cycle, OLAP, data mining techniques, applications, and current trends in data mining.

53) SMT60346 Artificial Intelligence

Prerequisite courses: SMT60301 Algorithms and Programming

This course provides fundamental knowledge of artificial intelligence including definitions, scope, characteristics, algorithms, and programming. Topics include problem solving, search algorithms, soft computing, and examples of AI applications.

54) SMT60347 Artificial Neural Networks

Prerequisite courses: SMT60301 Algorithms and Programming

This course discusses theories, methods, and problems related to artificial neural networks. Topics include basic neural networks, perceptrons, multilayer perceptrons, backpropagation methods, neural network algorithms, and examples of neural network applications.

55) SMT60348 Nonparametric Statistics

Prerequisite courses: SMT60305 Data Analysis and Visualization

This course discusses statistical inference using nonparametric approaches including one-sample tests, two independent sample tests, two dependent sample tests, K independent sample tests, K dependent sample tests, correlation measures, and significance testing.

56) SMT60349 Experimental Design

Prerequisite courses: SMT60305 Data Analysis and Visualization

This course discusses the basic principles of experimental design including completely randomized design, randomized block design, Latin square design, Graeco-Latin square design, balanced incomplete block design, factorial designs with two or more factors, split-plot design, strip-plot design, and response surface methodology.

57) SMT60350 Statistical Computing

Prerequisite courses: SMT60305 Data Analysis and Visualization

This course covers programming concepts for numerical and graphical statistical analysis. Topics include data types and structures, control flow and loops, text manipulation, writing and calling functions, data scraping, fitting statistical models, data transformation, optimization, handling large datasets, bootstrap, and jackknife methods.

58) SMT60351 Categorical Data Analysis

Prerequisite courses: SMT60305 Data Analysis and Visualization

This course discusses statistical analysis of categorical response variables (nominal and ordinal). Topics include contingency tables, logistic regression, multinomial regression, ordinal regression, Poisson regression, model selection and evaluation, and applications.

59) SMT60352 Time Series Analysis

Prerequisite courses: SMT60305 Data Analysis and Visualization

This course studies the fundamentals of forecasting, patterns in time series data (trend, seasonal, cyclical, and irregular), autocorrelation, stationarity, white noise processes, moving average and smoothing methods, time series decomposition, regression in time series context, ARIMA models, and applications using statistical software.

60) SMT60353 Introduction to Multivariate Statistics

Prerequisite courses: SMT60305 Data Analysis and Visualization

This course introduces multivariate statistical analysis, including matrix and random vector definitions, testing multivariate normality, inference for mean vectors, multivariate analysis of variance (MANOVA), assumptions in MANOVA, factorial MANOVA, multivariate analysis of covariance (MANCOVA), and their implementation using statistical software such as SPSS or R.

5. Off-Campus Learning Course Group

1) MLK60602 Field Work Practice

Field Work Practice (*Praktik Kerja Lapangan / PKL*) is undertaken for one month. PKL is an activity in which students apply the knowledge they have acquired during their studies. The purpose of PKL is to help students understand organizational management, identify problems arising in the workplace, and develop problem-solving skills in the institution where the PKL is conducted. In addition, PKL may support students in preparing their final project and broaden their understanding of the professional work environment. PKL may take the form of problem solving in the host institution and the application of science and technology.

2) MLK60605 Community Service Program

This course consists of field practice for one and a half months. The program is conducted in villages in the Special Region of Yogyakarta and Central Java. Students are trained to develop personal qualities such as teamwork, respect for others, and similar values. In addition, students practice social interaction with community members, act as motivators, and apply their knowledge to help solve problems in the community.

6. Scientific Development Course Group

1) MKK60301 Research Methodology

Course description: Adjusted to the guidelines provided by the University.

This course equips students with basic concepts and techniques in research methods relevant to the field of mathematics. Students will understand the principles of scientific research, research design, data collection and analysis techniques, and interpretation of results. The main focus is placed on optimization, modeling and the application of mathematical models, as well as computation. In addition, students will learn to prepare research proposals, conduct literature reviews, and write scientific reports systematically.

2) MKK60801 Final Project

This course is the students' final project, presented in the form of a scientific paper based on either a literature study or the application of mathematics. The writing of the final project follows the guidelines for the undergraduate thesis. Students complete the thesis under the supervision of a lecturer whose expertise matches the student's topic. The final output of this course is a thesis article published in a student mathematics journal, an international seminar proceeding indexed by Scopus, or a reputable international journal.

7. Additional Competency Course Group

1) SMT60354 Database Systems

Prerequisite courses: SMT60301 Algorithms and Programming

This course provides understanding and mastery of database concepts, the relational data model, database design techniques and normalization, the use of query language (SQL) for searching, sorting, filtering, deleting, and updating data, as well as the development of database application programs.

2) SMT60355 Regression Analysis

Prerequisite courses: SMT60305 Data Analysis and Visualization

This course covers methodologies for fitting simple linear regression (SLR) models, statistical inference for SLR models, diagnostic checking, assumption verification and remedial measures for SLR models, solving SLR models using matrix algebra, methodologies for fitting multiple linear

regression (MLR) models, statistical inference for MLR models, binary and qualitative indicator predictors, model fitting diagnostics, model selection, and model building.

3) SMT60356 Creativity, Innovation, and Entrepreneurship

Prerequisite courses: None

This course discusses entrepreneurship, including the role of entrepreneurs in a country, the reasons why graduates are encouraged to become entrepreneurs, the role of government in fostering entrepreneurship, the meaning of entrepreneurship, the skills required for entrepreneurs, entrepreneurial attitudes and profiles, entrepreneurship as a holistic human endeavour, and the causes of business failure. The course also examines techniques for developing creativity, as well as issues and challenges encountered in entrepreneurial practice.

4) SMT60357 Transformational Geometry

Prerequisite courses: SMT60306 Analytic Geometry

This course studies the concepts and principles of isometric and similarity transformations in the plane using synthetic, analytic, and matrix approaches. Isometric transformations include translation, reflection, rotation, and glide reflection, while similarity transformations include dilation, stretching, and shearing. The course also discusses compositions of these transformations, invariant properties under transformations, matrix representations of transformations, and applications of geometric transformations in various fields including graphic design, animation, and technology.

J. APPENDIX List of Course Mapping for the 2020 to 2025 Curriculum

DRAFT COURSE MAPPING FROM CURRICULUM 2020 TO CURRICULUM 2025

No	Curriculum 2020		Curriculum 2025		Remarks
	Course Code	Course Name	Course Code	Course Name	
1.	MKU6201	Islamic Religious Education	MWK60201	Islamic Religious Education	
2.	MKU6202	Catholic Religious Education	MWK60202	Catholic Religious Education	
3.	MKU6203	Protestant Religious Education	MWK60203	Protestant Religious Education	
4.	MKU6204	Hindu Religious Education	MWK60204	Hindu Religious Education	
5.	MKU6205	Buddhist Religious Education	MWK60205	Buddhist Religious Education	
6.	MKU6206	Confucian Religious Education	MWK60206	Confucian Religious Education	
7.	MKU6207	Civic Education	MWK60207	Civic Education	
8.	MKU6208	Pancasila	MWK60208	Pancasila	
9.	MKU6209	Indonesian	MWK60209	Indonesian	
10.	MKU6211	English	MWU60201	English	Renamed
11.	MKU6212	Digital Transformation	-	Digital Transformation	Removed (University policy)
12.	MKU6213	Creativity, Innovation, and Entrepreneurship	SMT60356	Creativity, Innovation, and Entrepreneurship	Converted to an elective in the Additional Competency course group
13.	MKU6216	Social and Humanitarian Literacy	-	Social and Humanitarian Literacy	Removed (University policy)
14.	-	-	MWU60202	Sports and Physical Fitness	New course
15.	-	-	MWU60203	Education and Sustainable Development	New course
16.	-	-	MKK60301	Research Methodology	New course
17.	FMI6201	Scientific Perspectives in Mathematics and Natural Sciences	FMI60201	Scientific Perspectives in Mathematics and Natural Sciences	
18.	FMI6202	Statistics	FMI60202	Statistics	Renamed
19.	MAT6301	Logic and Set	SMT60304	Logic and Set	
20.	MAT6302	Differretial Calculus	SMT60303	Differretial Calculus	
21.	MAT6303	Geometry	-	-	Removed (IndoMS recommendation); basic geometric reasoning content integrated into Analytic Geometry
22.	MAT6204	Number Theory	SMT60201	Number Theory	

No	Curriculum 2020		Curriculum 2025		Remarks
	Course Code	Course Name	Course Code	Course Name	
23.	MAT6305	Integral Calculus	SMT60307	Integral Calculus	
24.	MAT6306	Elementary Linear Algebra	SMT60302	Elementary Linear Algebra	Moved to Semester 1
25.	MAT6307	Algorithms and Programming	SMT60301	Algorithms and Programming	Moved to Semester 1
26.	MAT6308	Analytcs Geometry	SMT60306	Analytcs Geometry	
27.	MAT6309	Discrete Mathematics	SMT60308	Discrete Mathematics	
28.	MAT6310	Data Analysis and Visualization	SMT60305	Data Analysis and Visualization	Moved to Semester 1
29.	MAT6311	Introduction to Group Theory	SMT60310	Introduction to Group Theory	
30.	MAT6312	Multivariabel Calculus	SMT60202	Multivariabel Calculus	
31.	MAT6313	Differential Equations	SMT60401	Differential Equations	
32.	MAT6314	Linear Programming	SMT60311	Linear Programming	
33.	MAT6315	Probability Theory	SMT60312	Probability Theory	
34.	MAT6316	Partial Differential Equations	SMT60317	Partial Differential Equations	
35.	MAT6317	Introduction to Mathematical Statistics	SMT60316	Introduction to Mathematical Statistics	
36.	MAT6318	Introduction to Real Analysis	SMT60203	Introduction to Real Analysis	
37.	MAT6319	Linear Algebra	SMT60313	Linear Algebra	
38.	MAT6320	Introduction to Ring Theory	SMT60204	Introduction to Ring Theory	
39.	-	-	SMT60315	Advanced Calculus	New course – IndoMS recommendation
40.	MAT6321	Real Analysis	SMT60314	Real Analysis	
41.	MAT6322	Complex Analysis	SMT60318	Complex Analysis	
42.	MAT6323	Numerical Methods	SMT60322	Numerical Methods	
43.	MAT6324	Mathematical Modelling	SMT60323	Mathematical Modelling	
44.	MAT6325	Computer Applications	SMT60309	Computer Applications	
45.	MAT6326	Introduction to Regression Analysis	SMT60355	Regression Analysis	Converted into an elective in the Additional Competency course group
46.	MAT6327	Information Systems and Databases	SMT60354	Databases	Renamed and converted into an elective in the Additional Competency course group
47.	-	Transformational Geometry	SMT60357	Transformational Geometry	Converted from an MBKM course into an elective in the Additional Competency course group

No	Curriculum 2020		Curriculum 2025		Remarks
	Course Code	Course Name	Course Code	Course Name	
48.	MAT6328	Graph Theory	SMT60321	Graph Theory	
49.	MAT6229	Fuzzy Set Theory	SMT60205	Fuzzy Set Theory	Moved to Semester 4
50.	MAT6330	Object-Oriented Programming	SMT60319	Object-Oriented Programming	
51.	MAT6331	Operations Research	SMT60320	Operations Research	
52.	MAT6332	Module Theory	SMT60324	Module Theory	
53.	MAT6333	Cryptography	SMT60325	Cryptography	Renamed
54.	MAT6334	Matrix Theory	-	-	Removed
55.	MAT6335	Coding Theory	SMT60327	Coding Theory	
56.	MAT6336	Fuzzy Logic	SMT60328	Fuzzy Logic	
57.	MAT6337	Applied Linear Algebra	SMT60326	Applied Linear Algebra	
58.	-	-	SMT60329	Finite Fields and Their Applications	New course
59.	MAT6338	Introduction to Functional Analysis	SMT60330	Introduction to Functional Analysis	
60.	MAT6339	Geometry Systems	SMT60331	Fractal Geometry	Renamed
61.	MAT6340	Introduction to Dynamical Systems	-	-	
62.	MAT6341	Introduction to Measure Theory and the Lebesgue Integral	SMT60332	Introduction to Measure Theory	Renamed
63.	MAT6342	Introduction to Topology	SMT60206	Introduction to Topology	Changed to a compulsory course
64.	MAT6343	Differential Geometry	SMT60333	Differential Geometry	
65.	-	-	SMT60334	Numerical Analysis	New course
66.	MAT6344	Financial Mathematics	SMT60335	Financial Mathematics	
67.	MAT6345	Engineering Mathematics	SMT60336	Engineering Mathematics	
68.	MAT6346	Initial and Boundary Value Problems	SMT60337	Initial and Boundary Value Problems	
69.	MAT6347	Mathematical Biology	SMT60338	Mathematical Biology	
70.	MAT6348	Optimization and Control Theory	SMT60339	Optimization and Control Theory	
71.	MAT6349	Queueing Theory	SMT60340	Queueing Theory	
72.	MAT6350	Decision Support Systems	SMT60341	Decision Support Systems	
73.	MAT6351	Web Design Programming	SMT60342	Web Design Programming	
74.	MAT6352	Digital Image Processing	SMT60343	Digital Image Processing	
75.	MAT6353	Mobile Application Programming	SMT60344	Mobile Application Programming	
76.	-	-	SMT60345	Data Mining	New course
77.	MAT6354	Artificial Intelligence	SMT60346	Artificial Intelligence	

No	Curriculum 2020		Curriculum 2025		Remarks
	Course Code	Course Name	Course Code	Course Name	
78.	MAT6355	Artificial Neural Networks	SMT60347	Artificial Neural Networks	
79.	MAT6356	Nonparametric Statistics	SMT60348	Nonparametric Statistics	
80.	MAT6357	Experimental Design	SMT60349	Experimental Design	
81.	MAT6358	Statistical Computing	SMT60350	Statistical Computing	
82.	MAT6359	Categorical Data Analysis	SMT60351	Categorical Data Analysis	
83.	MAT6360	Time Series Analysis	SMT60352	Time Series Analysis	
84.	MAT6361	Introduction to Multivariate Statistics	SMT60353	Introduction to Multivariate Statistics	