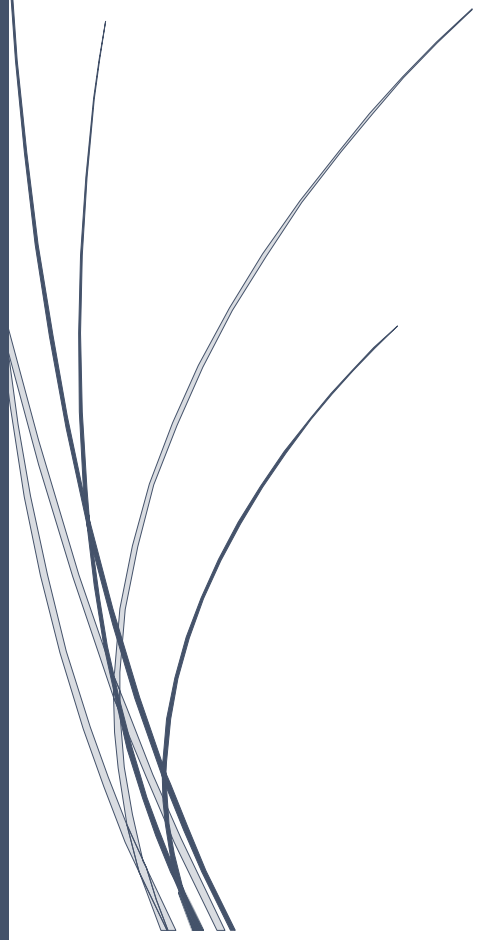
2021

# GUIEDBOOK FOR MERDEKA BELAJAR – KAMPUS MERDEKA (MBKM) PROGRAMME

**MATHEMATICS STUDY PROGRAM**
**FACULTY OF MATHEMATICS AND NATURAL SCIENCES**
**SEBELAS MARET UNIVERSITY**



## PRAKATA

By expressing gratitude to Allah SWT, Guide book for Merdeka Belajar – Kampus Merdeka (MBKM) Mathematics Study Program FMIPA UNS has been published. The MBKM policy consists of four main programs, namely: (1) the establishment of new study programs for PTN and PTS with A and B accreditation, (2) a re-accreditation program that is automatic for all ranks and voluntary for universities and study programs that areready to move up the rankings, (3) freedom for PTN Public Service Agency (BLU) and PTN Work Unit (satker) to become PTN Legal Entity (PTN BH), and (4) the right to take courses outside the study program and changes in the definition of semester credit units (SKS). This guidebook is published to serve as a reference for students and academic advisors so that independent campus activities can run orderly, smoothly, and according to interests.

This guidebook contains information about the program foundation, implementation, and recognition of MBKM in Mathematics Study Program FMIPA UNS. Hopefully this guidebook is useful. For the contribution of all parties in the preparation of this guidebook, we thank you.

Surakarta, November 15, 2021
Compilation Team

**TABLE OF CONTENTS**

# CHAPTER I. INTRODUCTION

## A. Background Background

This book was published with the aim of serving as a guideline for the implementation of Merdeka Belajar - Kampus Merdeka in the Mathematics Study Program (Prodi) FMIPA UNS. In principle, Merdeka Belajar - Kampus Merdeka (MBKM) activities at UNS consist of 9 off-campus learning activities, namely *first,* Internship / Industrial Practice. *Second,* projects in the village. *Third,* student exchange. *Fourth,* research/research. *Fifth,* entrepreneurship. *Sixth,* independent study/project. *Seventh,* humanitarian projects. *Eighth,* teaching at school. *Ninth,* state defense. Through this guideline, it is expected that study programs can implement and develop MBKM programs optimally, effectively, efficiently, and with quality in accordance with the National Higher Education Standards. This guideline is expected to be useful for managers or leaders of universities, lecturers, students,industry partners, and other related parties.

The implementation of Merdeka Belajar - Kampus Merdeka is to realize the national goals of education as mandated by Law Number 12 of 2012. In order to realize this, the Ministry of Education and Culture facilitates Higher Education through the Merdeka Belajar - Kampus Merdeka policy. Merdeka Belajar Policy

- The Merdeka Campus is implemented in order to realize an autonomous and flexible learning process in higher education so as to create a learning culture that is innovative, not restrictive, and in accordance with student needs. This policy also aims to improve *links and matches* with industry, the business world, and the world of work, and to prepare students for the world of work from the start.

Through the Merdeka Belajar - Kampus Merdeka policy, universities are required to design and implement innovative learning processes so that students can achieve optimal learning outcomes. Students are given the freedom to take learning credits outside the study program for 3 (three) semesters, which can be taken from outside the study program in one university (PT) and / or outside the PT.

## B. Legal Basis

1. Higher Education Accreditation System

   Permendikbud No. 5 of 2020 concerning Accreditation of Study Programs and Higher Education.
2. Legal Entity State Universities
   a. Permendikbud No. 4 of 2020 concerning the Conversion of State Universities into Legal Entity State Universities.
   b. Permendikbud Number 6 of 2020 concerning New Student Admissions.
3. Right to Study Three Semesters Outside the Study Program
   a. Permendikbud No. 3 of 2020 concerning National Standards for Higher Education for Undergraduate Programs at State Universities.
   b. UNS Rector Regulation No. 31 of 2020 concerning the Implementation and Management of Undergraduate Programs.

## C. Destination

Merdeka Learning-Campus Merdeka Goals

a. Encourage an increasingly autonomous and flexible learning process in Higher Education, and create a learning culture that is innovative, non-restrictive, and in accordance with student needs.
b. Improve the competence of graduates, both *soft skills* and *hard skills*, so that they are better prepared and relevant to the needs of the times, preparing graduates as future leaders of the nation who are superior and have personality.
c. Provide students with sufficient experience to work in the industrial world or the real professional world.
d. *Experiential* learning programs with flexible pathways are expected to facilitate students to develop their potential according to their *passions* and talents.

# CHAPTER II. PROGRAM MBKM

Based on the UNS Rector Regulation No. 31 of 2020, concerning the Implementation and Management of Undergraduate Education Programs, the forms of MBKM activities at UNS consist of eight Ministry of Education and Culture MBKM activities, namely internships / work practices, village development / KKN projects, teaching in educational units, student exchanges, research, entrepreneurship projects, independent studies / projects, humanitarian projects; one typical UNS MBKM activity, namely state defense; and other forms determined by the rector. The state defense program is an additional program as a form of realization of UNS Fort Pancasila. The form of independentlearning can be done both inside and outside the study program (prodi). The form of learning outside the study program is a learning process consisting of:

1. Learning in other study programs at the same university (PT);
2. Learning in the same and different study programs at different universities;
3. Learning at non-college institutions.

The learning process outside the study program must be carried out with the guidance of lecturers. This program is expected to provide contextual experience that willimprove student competence as a whole, ready to work, or create new jobs. Students together with the academic advisor must develop a study plan while studying in the Mathematics Study Program including choosing courses or internships. Students take a minimum of 144 credits consisting of compulsory courses (university, faculty, and study program), elective courses, and MBKM program (course recognition). Compulsory and elective courses can be taken within the study program, outside the study program within UNS, or outside UNS. Students may also choose or not choose one of the MBKM programs. The MBKM program can be a national program prepared by the Ministry or a program prepared by universities registered in the Higher Education Database.

### *A. Student Exchange*

Student exchange is a program that provides opportunities for students to take courses outside the study program (*outbound*), namely lecture activities attended by students of the Mathematics Study Program FMIPA UNS at

1. Another different study program at UNS;
2. Other same or different study programs outside UNS, within Indonesia;
3. Other same or different study programs in foreign universities. The

objectives of student exchange activities include:

1. Form an attitude of respect for the diversity of cultures, views, religions, and beliefs, as well as the opinions or original findings of others; as well as working together and having social sensitivity and concern for society and the environment.
2. Building student friendships between regions, tribes, cultures, and religions so as to increase the spirit of national unity and integrity.
3. Organizing the transfer of knowledge to cover educational disparities both between domestic universities, as well as the conditions of domestic higher education with foreign countries.
4. Increase scientific insight by providing opportunities for students to gain learning experience outside the study program.
5. Improve the quality and competitiveness of graduates at the international level.
6. Improving the academic atmosphere in study programs and faculties that can encourage innovation and the birth of academic works of international reputation.
7. Improving the institution's ranking on an international scale as an internationally reputable faculty and study program

This activity can be carried out with allied study programs from other universities (both at home and abroad). Taking courses in student exchange can be taken starting from semester 5 (five), getting approval from the academic supervisor, and being accepted by the destination study program. Courses that can be taken by students to support thefulfillment of learning outcomes are courses contained in the curriculum structure of the study program which can take the form of compulsory or elective courses. The selected courses should be able to enrich and provide benefits in realizing the profile of study program graduates or adding student competencies. This activity can last for one semester. Special requirements for exchange programs

overseas students are to include a *Letter of Acceptance* from the organizer and a letter of *financial support*. The mechanism for implementing student exchange activities can be seen in Figure 2.1. Students must consult with their academic advisor and get approval regarding participation in student exchange activities. Grades and credits taken at foreign universities will be equalized by the Mathematics Study Program FMIPA UNS.

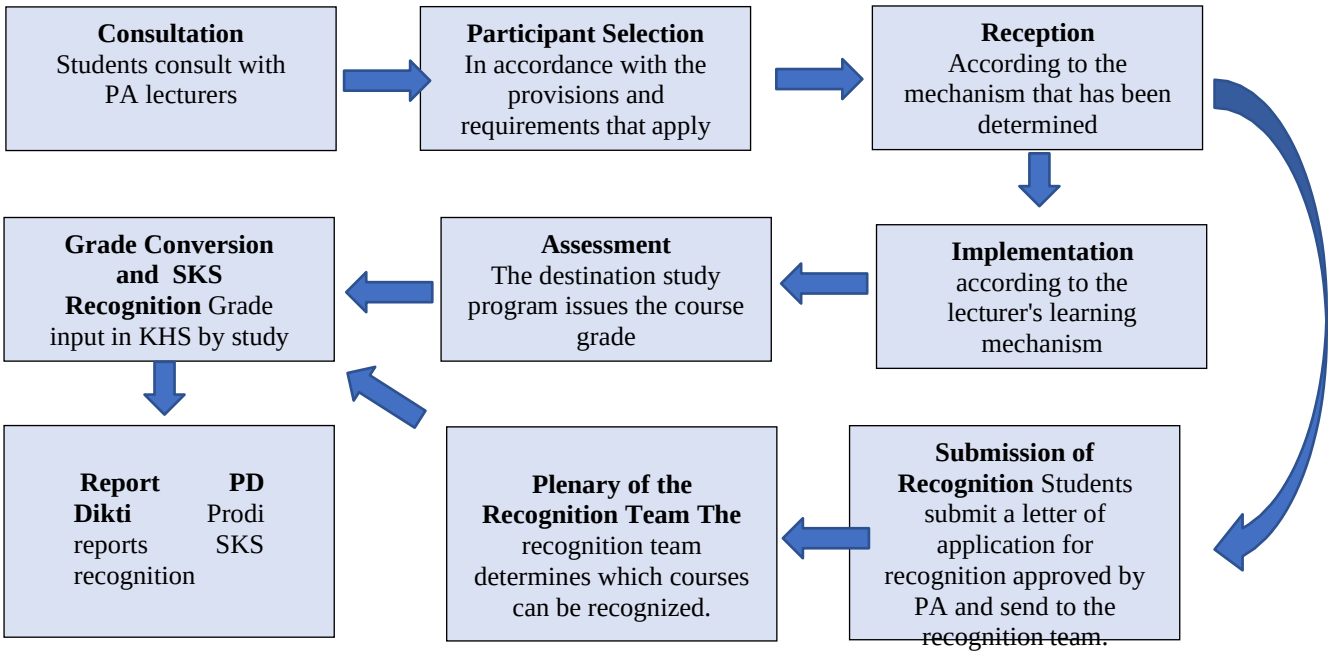



**Figure 2.1**. Mechanism of student exchange activities

In addition to *outbound* activities, the Mathematics Study Program of FMIPA UNS also offers courses for *inbound* activities for students outside the study program. Here are some provisions for *inbound* activities.

1. Follow all provisions of the Faculty of Mathematics and Natural Sciences and Sebelas Maret University;
2. Lecture activities follow the Sebelas Maret University academic calendar;
3. Courses with a description of PJJ (distance learning system) are conducted online and offline simultaneously;
4. The capacity for students from outside the Mathematics Study Program FMIPA UNS for each course is 10 students;
5. Students are required to attach transcripts of grades in previous semesters;
6. If there are courses that are over quota, the study program will sort by GPA and university of origin (as weight);

7. Mathematics Study Program of FMIPA UNS has the right to cancel students' choice of courses if similar courses (with similar SLOs) have been taken by the students concerned in the previous semester in other study programs/universities;
8. Students from outside the study program are not required to take prerequisite courses, but please pay attention to both the prerequisites and the semester of the course to be taken;
9. Register through the study program web by including
    a. Recommendation letter from Academic Supervisor or Head of Study Program at home campus.
    b. Temporary transcript containing the grades of previous semesters (Study Result Card)

**B. MBKM *Non-Student Exchange* Program**

MBKM activities that can be followed by students of the Mathematics Study Program FMIPA UNS besides student exchanges include internships / work practices, teaching assistance in educational units, research / research, humanitarian projects, entrepreneurial activities, independent studies / projects, building villages, and defending the country. The objectives of each MBKM program are described in Table 2.1.

1. *Internship / work practice* is an internship activity in a company, non-profit foundation, multilateral organization, government institution, or startup company. MBKM internship activities refer to the **Merdeka Learning - Kampus Merdeka Internship Guidelines for the Mathematics Study Program FMIPA UNS**.
2. *Research* is an academic research activity, both science and social humanities, conducted under the supervision of lecturers or researchers. This activity can becarried out for research institutions such as LIPI/BRIN, and other institutions.
3. *Village projects* are social projects to assist communities in rural or remote areas in developing the people's economy, infrastructure, and others. This activity can be done together with the village apparatus (village head), BUMDes, cooperatives, or other village organizations.
4. *School teaching* is the activity of teaching in elementary, middle, or high schools for several months, whether the school is in an urban or remote location.
5. *Entrepreneurial activities*, students develop entrepreneurial activities independently, evidenced by an explanation/proposal of entrepreneurial activities.

6. *Independent study/project*, students can develop a project based on a specific topic and can be done in groups of students.
7. *Humanitarian projects* are social activities in the form of volunteer activities in non-profit organizations engaged in humanitarian, welfare, health, education, both at home and abroad; or in the government engaged in welfare, humanitarian, health, and education.
8. *State defense is* a program of UNS and is handled directly by the university. State Defense Training is a state defense training activity for students needed for character building (discipline, cooperation, responsibility, etc.), strengthening mental revolution (anti-corruption, honesty, fairness), and preparing students in facing various forms of threats (such as drug abuse, radicalism, separatism, natural disasters, conflicts between students, and the spread of infectious diseases). State defense activities for students at UNS are pioneering the implementation of state defense at the university level in Indonesia.

**Table 2.1**. Objectives of each MBKM program

| No. | MBKM Program | Destination |
|---|---|---|
| 1. | Internship/Work Practice | a. Provide sufficient learning to students and provide hands-on experience in the workplace (*Experiential Learning*).<br>b. Improve hard skills (Skills, *complex problem solving, analytical skills*, etc.), as well as *soft skills* (Professional/work ethics, communication, cooperation, etc.) of students.<br>c. Assisting industry partners to secure the required talent as a follow-up to professional practice. For example, direct *recruitment* process.<br>d. Students who are familiar with the workplace will be more competent in entering the world of work and careers. |
| 2. | Research | a. Provide space for research collaboration between students, lecturers, and research institutes.<br>b. Provide space for students to apply applied research on current problems and be useful for overcoming the problems faced, improving the welfare of the community, and the nation.<br>c. Improve the quality of student research results and obtain a basis for research activities directly from researchers within the scope of research institutions.<br>d. Instill a culture and quality of research in research institutions so as to produce prospective human resources and regenerate researchers to solve various national problems.<br>e. Build critical thinking, so that students have good research knowledge and skills. |

| | | |
|---|---|---|
| 3. | Independent Study/Project | a. Realizing students' ideas in developing innovative products that become their ideas. |
| | | b. Organizing research based on research and development (R&D).<br>c. Improve student achievement in national and international events. |
| 4. | Entrepreneurial Project | a. Provide opportunities for students who have an interest in entrepreneurship to develop their business early and guided.<br>b. Addressing the unemployment problem that produces intellectual unemployment among graduates.<br>a. Creating new job creators and future successful entrepreneurs from the university community. |
| 5. | Humanitarian Project | a. Prepare excellent students who uphold human values in carrying out their duties based on religion, morals and ethics.<br>b. Train students to have social sensitivity to explore and dive into existing problems and participate in providing solutions according to their respective interests and expertise.<br>c. Assist individuals and communities in developing and improving skills and abilities to use<br>resources available to solve the problem at hand. |
| 6. | Teaching in the Education Unit | a. Provide opportunities for students who have an interest in the field of education to participate in teaching and deepen their knowledge by becoming educators in education units.<br>b. Shaping students' knowledge, skills, and professional attitudes as prospective educators.<br>c. Students experience firsthand the learning process and strengthen the educator's identity, by becoming a teacher's assistant, which is carried out, among others, through teaching activities with the inherent guidance of student teachers and supervisors and carrying out student assistance tasks and activities.<br>extracurricular. |
| 7. | Village Building Project | a. Realizing one of the Tri Dharma of Higher Education, namely the field of community service.<br>b. Assisting students in applying science, technology and art learned directly in accordance with the theory so as to benefit the community.<br>c. Equip students with the ability to approach the community and form attitudes and behaviors to always be sensitive to<br>problems faced by the community. |
| 8. | State Defense Training | a. Promote leadership, independence, solidarity and patriotism.<br>b. Cultivate a sense of love for the country and have an actualization of the awareness of nation and state.<br>c. Improve personal, group, and national discipline so as to have a competitive character in the international arena.<br>d. Growing and increasing national insight and nationalism against issues that divide the nation... |

This activity can be carried out by active students starting in semester 5, approved by the academic supervisor, and accepted by the partner / organizer. The mechanism for

implementing MBKM non *student exchange* activities can be seen in Figure 1.

2.2. Students must consult with their academic advisor and get approval about participating in MBKM activities. Students register and follow the selection according to the provisions of the partner or organizer. The study program determines the supervisor for each MBKM activity in order to guide and supervise the implementation of activities by students.

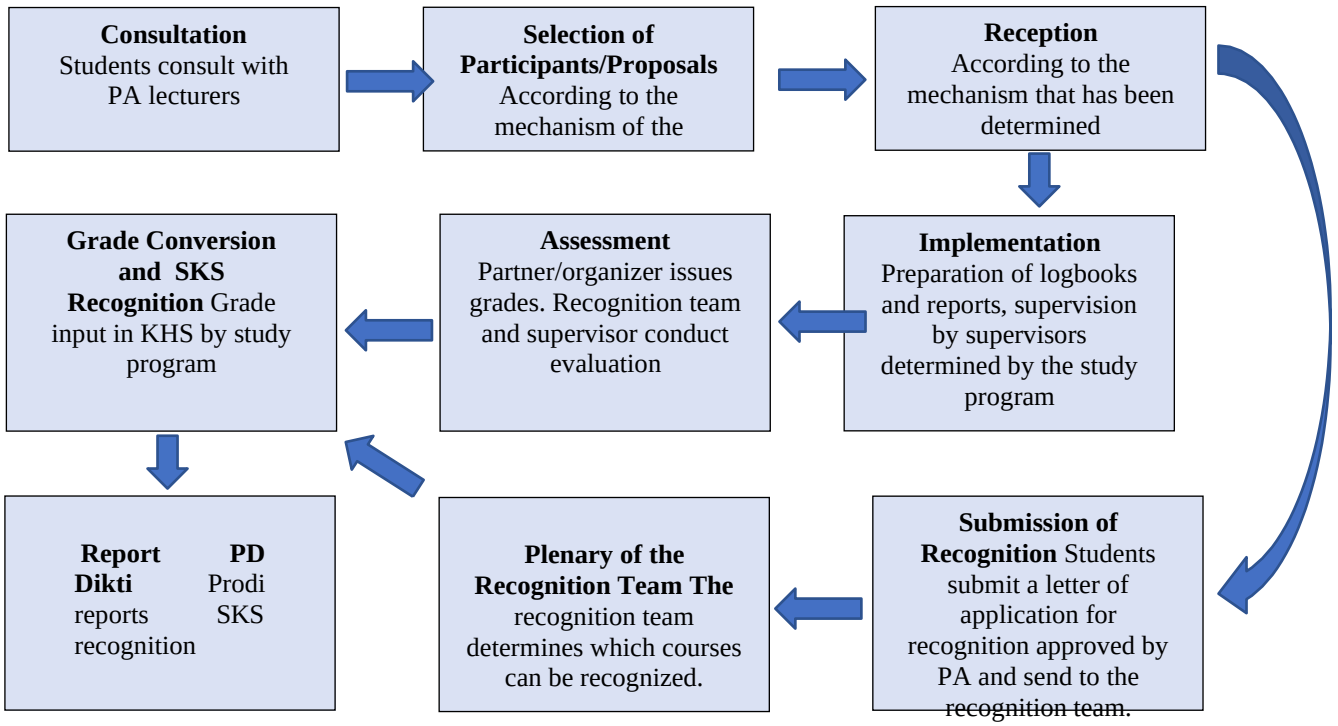



**Figure 2.2**. Mechanism of MBKM non *student exchange* activities

# CHAPTER III. RECOGNITION

Recognition is the recognition of student learning activities outside the campus and equates them with course credits in the study program curriculum. Activities that can be recognized are activities that meet curriculum requirements and are programmed in the student's KRS. The purpose of recognition is to recognize off-campus learning activities that are equivalent to regular lecture credits.

## A. Rights and Responsibilities Students

Students have rights and obligations in the implementation of MBKM. The rights of students of the Mathematics Study Program FMIPA UNS include:

1. Students have the right to study three semesters outside the study program:
   (a) Can take credits in other study programs within or outside UNS for 1 semester or the equivalent of 20 credits.
   (b) Can take credits outside UNS for a maximum of 2 semesters or the equivalent of 40 credits.

   *Student exchange* and *non-student exchange* MBKM activities can be participated in by students at least in semester 5.
2. Students are entitled to participate in MBKM activities with a maximum of 20 credits in one semester.
3. Students are entitled to a grade for courses approved for recognition if they follow the program properly.

The obligations of students in participating in the MBKM program include:

1. Obtain approval from the academic supervisor to participate in MBKM activities.
2. Students follow the selection and carry out MBKM activities until completion in accordance with the partner / organizer mechanism.
3. Maintain personal and institutional good name (study program, faculty, university)
4. Fill in the *logbook* according to the activities performed.
5. Prepare activity reports and submit them to the study program.

## B. Policy and Quality Assurance by Study Program

In order to support the MBKM program to run well, the study program facilitates student rights as follows.

1. The study program develops policies and guidelines for the MBKM program that are integrated with college policies to facilitate learning activities outside the study program, including developing and adjusting the curriculum to the independent campus implementation model.
2. The study program through the recognition team conducts a plenary to discuss the recognition of the MBKM program into course credits to be included in the transcript and or Certificate of Diploma Companion (SKPI).
3. The study program assigns a supervisor for *non-student exchange* MBKM activities in the context of guidance and supervision.
4. The study program develops cooperation and expands it with activities that support the implementation of the MBKM program by making cooperation documents (MoA / MoU) with partners. Thus, the programs implemented can be arranged and agreed upon between the study program and partners. The study program is still obliged to carry out quality assurance in supporting the implementation of MBKM programs. In order for the implementation of the MBKM policy to run smoothly

To ensure quality, it is necessary to establish several qualities, including:

1. Quality of participants' competencies.
   a. Students together with the academic advisor develop a study plan while studying at the Mathematics Study Program FMIPA UNS including choosing courses or MBKM programs. Students take a minimum of 144 credits consisting of compulsory courses (university, faculty, and study program), elective courses, and MBKM programs (recognition courses). Academic supervisors approve the MBKM program proposed by students by taking into account the rights and academic load of students.
   b. Students who take part in the independent learning program must follow the selection and meet the requirements in accordance with the guidelines that have been determined in each independent learning activity.
2. Quality of MBKM program

   Some recommended criteria for off-campus activities to maintain quality and obtain credit recognition are described in Table 3.1. In general, these are

a. MBKM activities held by government institutions, universities, companies, research institutions, foundations/organizations.
b. Activities that have been agreed between the study program/faculty/university and partners.
c. Activities programmed by study programs/faculties/universities that already have a measurable independent campus curriculum.
d. Activities that receive guidance from supervisors appointed from partners/organizers.

3. Quality of implementation.

   The study program assigns supervisors in order to provide guidance and supervision so that students can follow the MBKM program properly from start to finish. Students actively fill in the *logbook* according to the activities carried out. At the end of the activity, students make an activity report and submit it to the study program.

4. Quality of assessment.
   a. Assessment in the implementation of MBKM activities is carried out during the activity (process assessment) and at the end of the activity in the form of a learning activity report (results report). Assessment in the process is carried out by means of observation (personality and social) as the main technique. While the results assessment is carried out at the end of the program implementation using reports made by students. The assessment is carried out by partners / organizers related to the activities taken bystudents.
   b. The aspects assessed in the implementation of the MBKM policy at least include attendance during debriefing and implementation, discipline and responsibility in carrying out tasks, attitude, ability to carry out tasks, ability to make reports.
   c. The study program evaluates the suitability of the SLOs of the recognised courses and MBKM activities, as well as evaluates the assessment of the MBKM program from the partner / organizer, before inputting the conversion of grades and credits into the UNS Siakad system.

**Table 3.1**. Criteria for Off-Campus Activities

| No. | Activities | Criteria |
|---|---|---|
| 1. | Student Exchange | a. The type of subjects taken must meet the requirements set by the home study program to graduate (e.g. fulfill the basic curriculum, fulfill general lecture requirements, fulfill electives requirements).<br>a. The accreditation of the destination study program is at least the same as the accreditation of the origin study program. |
| 2. | Internship/Practice Work | a. The skill level required for the internship should be equivalent to an undergraduate level (not high school level and below).<br>b. Students are part of a team - actively involved in team activities.<br>c. Students get feedback on performance every 2 months.<br>d. Had to give a presentation at the end of the internship to one of the company leaders. |
| 3. | Teaching Assistance in Unit Education | Determine the targets to be achieved during the activity (e.g. improving students' numerical skills, etc.) and their achievement evaluated at the end of the activity. |
| 4. | Research | a. The type of research (level of difficulty) should be appropriate for the undergraduate level.<br>b. Must be involved in the production of the final report/presentation of the research results. |
| 5. | Humanitarian Project | a. Dedicate to 1 or 2 main projects, focusing on: Solving social problems (e.g. lack of health workers in the area, inadequate sanitation) and Providing labor assistance to ease the burden of disaster victims.<br>b. Generate tangible impact at the end of the activity (e.g. becoming a medic in the midst of an outbreak). |
| 6. | Entrepreneurial Activities | a. Have a business plan and targets (short and long term).<br>b. Successfully achieved sales targets in accordance with the business plan targets set at the beginning.<br>c. Grow HR in the company in accordance with the business plan. |
| 7. | Independent Study | a. The type of independent study (level of difficulty) should correspond to the undergraduate level.<br>b. Independent study topics are not offered in the current HEI/program curriculum.<br>c. Students develop independent objectives along with curriculum design, lesson plans, type of final project, etc. to be achieved at the end of the study. |
| 8. | Building the Village | a. Dedicated to 1 or 2 main projects, focusing on: Community entrepreneurship capacity building, MSMEs, or BUM Desa; and Social problem solving (e.g. Lack of health workers in the village, inadequate sanitation development).<br>b. Generate tangible impacts at the end of the activity (e.g. more adequate village irrigation, village cooperatives making more profit). |
| 9. | State Defense | a. UNS programs that are handled directly by the university.<br>b. State defense training is intended for character building, strengthening mental revolution, and preparing students to face various forms of threats. |

## C. Recognition Process

The number of credits and grades from MBKM activities that count towards the GPA of 144 credits are the credits of the approved recognition course for the activity. The recognition team validates the validity of the credits obtained, and accesses the value obtained from MBKM activities. UNS still refers to the *structured form* in equalizing the weight of MHBM, namely independent learning activities structured in accordance with the study program curriculum. MBKM credits are expressed in the form of equivalence with courses offered whose competencies are in line with MBKM activities. Therefore, compulsory and elective courses are needed to accommodate MBKM activities. MBKM courses are adjusted to the form of MBKM activities. Apart from the form of achievement assessment, the experience/competence gained during independent learning activities can also be written in portfolio form as SKPI.

In Permendikbud No. 59/2018, it is stated that SKPI is an official statement letter issued by Higher Education, containing information about the academic achievements or qualifications of graduates of degree higher education. The qualifications of graduates are narrated descriptively stating the learning outcomes of graduates. The benefits of SKPI for graduates:

1. As an additional document that states the employability, knowledge mastery, and attitude/morals of a graduate that is more easily understood by users at home and abroad than reading a transcript.
2. As an objective description of the holder's performance and competence.
3. Increase *employability* regardless of the rigidity of the type and level of study program.

In line with the minimum course recommendations for undergraduate Mathematics by IndoMS, Table 3.2 presents several courses from compulsory and directed elective courses that must be taken by students of the Mathematics Study Program FMIPA UNS through academic activities within the study program, or outside the study programthrough student exchange programs. The credits of *non-student exchange* MBKM activities cannot be recognized into the courses in the table, so they cannot be selected as MBKM courses.

**Table 3.2.** IndoMS 2021 Minimum Course Recommendations and Mathematics Study Program FMIPA UNS

| No. | IndoMS Recommended Courses | SKS Minimal | Description | Study Program Subjects Mathematics FMIPA UNS | SKS |
|---|---|---|---|---|---|
| 1. | Fundamentals of Mathematics | 3 | Logic, proof methods, set relations, mappings. | Mathematical Logic and Sets | 3 |
| 2. | Discrete Mathematics | 3 | Combination and permutation, inclusion-exclusion principle, *pigeon hole principle*, recursive relations, fundamentals of graph theory. | Introduction to Graph Theory | 2 |
| | | | | Introduction to Mathematics Discrete | 2 |
| | | | | Discrete Mathematics | 2 |
| 3. | Calculus Differential and Integral (3-4 Eyes Lecture) | 12 | Real number system, functions, limits, continuity, derivative, integral, sequence, series, vector functions, two/three functions variables, partial derivatives, function derivatives two/three variables, two/three fold integral, line integral, surface integral. | Calculus Differential | 3 |
| | | | | Calculus Integral | 3 |
| | | | | Multivariable Calculus | 3 |
| 4. | Statistics and Probability Theory (2-3 Courses) | 9 | Descriptive statistics and inference: probability of random variables, probability distributions of discrete and continuous random variables, sampling distributions, estimation, hypothesis testing, simple linear regression, determination of distribution limits, parameter estimation methods (point and interval estimates) and properties of point estimates, hypothesis testing.<br><br>Probability and distributions, some special distributions (discrete and continuous), multivariate distributions, and distributions of functions of random variables and their expectations.<br><br>Introduction to stochastic processes: Markov chain, Poisson process, renewal process. | Theory and Calculation of Chance | 3 |
| | | | | Explorative Data Analysis | 3 |
| | | | | Statistical Analysis | 3 |
| | | | | Math Statistics | 3 |
| | | | | Introduction to Stochastic Processes | 2 |
| 5. | Complex Functions | 3 | Complex numbers, complex functions, elementary transformations, analytic functions, complex integrals, rows and series of complex numbers, and residues and Poles. | Complex Functions | 3 |
| 6. | Introduction Real Analysis (1-2 Eyes Lecture) | 4 | Real number system, topology on R (including compact sets), lineup real numbers, real-valued functions, uniform continuity, function line real-valued, continuous function theorem and differential, Riemann integral, and | Real Analysis I | 3 |
| | | | | Real Analysis II | 3 |

| | | | | | |
|---|---|---|---|---|---|
| | | | Fundamendal theorem in calculus. | | |
| 7. | Algebra (2-3 Courses) | 7 | Systems of linear equations, matrices, decomposition, vector spaces, bases and dimensions, linear transformations, representation matrices, eigenvalues and vectors, | Matrix and Vector Space | 2 |
| | | | | Linear Algebra | 3 |
| | | | | Group Theory | 2 |
| | | | inner product space, orthogonalization, diagonalization, least squares difference, Cayley-Hamilton theorem.<br><br>Group, Lagrange theorem, cyclic group, group homomorphism, quotient group, isomorphism theorem, permutation group, ring, ring homomorphism, quotient ring, integral region, field, ring polynomial. | Ring Theory | 3 |
| 8. | Geometry | 3 | Cartesian coordinate system, circle, conic wedge (ellipse, parabol, and hyperbol), parameterized functions, coordinate transformations, vectors on a plane.<br><br>Plane equation, area equation, intersection of two areas, sphere equation, coordinate system in space. | Analytic Geometr y | 3 |
| 9. | Introduction to Numerical Analysis | 3 | *Error*, roots of nonlinear equations, systems of nonlinear equations, interpolation, numerical derivatives, numerical integration, initial value problem (Euler and Runge-Kutta methods). | Introduction to Numerical Mathematics | 3 |
| | | | | Numerical Math | 3 |
| 10. | Algorithms and Programming | 3 | Algorithms and programming concepts, data, variables, statements and operations, logic flow, *array* data structures, subprograms (procedures, functions and recursion), algorithm complexity. | Basic Algorithms and Programming with Python | 3 |
| 11. | Differential Equation (2-3 Course s) | 6 | First order GDP, higher order linear GDP with constant coefficients, series solution, Laplace transform, first order linear GDP system with constant coefficients.<br><br>First order GDP, classification and canonical form of linear second order GDP, wave equation, diffusion equation, Laplace equation, Fourier series, Sturm-Liouville problem with eigenfunction expansion and separation of variables method, Fourier transformation for the boundary condition problem and the initial value problem. | Equation Ordinary Differential | 3 |
| | | | | Introduction to Special Functions | 2 |
| | | | | Boundary Condition Problem | 3 |
| 12. | Linear Program | 3 | Linear program models, graphical methods, simplex methods, duality, sensitivity analysis, integer linear programs, transportation problems, and problems *assignment*. | Deterministic Operations Research | 3 |

| | | | | | |
|---|---|---|---|---|---|
| 13. | Mathematical Modeling | 3 | Modeling process includes problem identification and formulation, mathematical model construction, interpretation, refinement Model. | Mathematical Modeling | 2 |
| | | | | Epidemiological Modeling | 2 |
| 14. | Thesis | 6 | | Final Project | 6 |
| Minimum total credits | | 68 | | | 84 |

**Procedure for Submitting Activity Recognition related to MBKM Policy**

1. Students consult with their academic supervisor (PA).
2. After receiving approval from the PA lecturer, students fill out the MBKM Recognition Application Form. Description of activities, estimated number of credits of activities, plans and time (duration) of activities, and attachments of activity data (proposals, acceptance letters, flyers, web addresses, etc.) must be included.
3. Students submit the completed form to the Recognition Team of the Mathematics Study Program FMIPA UNS by attaching all supporting data.
4. The recognition team makes decisions regarding course recognition and the number of credits by taking into account the data submitted by students. The recognition team issues an MBKM Recognition Decision Letter. The basis of recognition is
   a. 1 credit hour is equivalent to $1 \times 170$ minutes $\times$ 16 weeks = 2720 minutes or 45 hours. one semester (PermenDikBud No. 3 of 2020, Article 19).
   b. Conformity with the SLOs of the recognition course. It should be noted that there is no guarantee that the number of credits of recognition courses to get value conversion is the same as the number of credits of independent learning activities.
   c. Recognition courses can be courses in both odd and even semesters, so that recognition courses can be inputted into siakad as MBKM courses in the same semester as independent learning activities, or in subsequent semesters after the activity is completed.
5. The recognition team sends a request to the study program admin for the data entry process to Siakad MBKM.
   a. Students can directly submit a *student exchange* proposal in Siakad without an offer from the study program.
   b. For *non-student exchange outbound* activities, the study program makes *outbound* MBKM offers and courses that are recognized into Siakad. Students are required to fill out a *logbook in* accordance with the MBKM activities carried out from beginning to end.
6. After the recognition course is determined, students include the learning outcomes of the MBKM course according to the independent learning activity plan into the MBKM Recognition Form. An example can be seen in Table 3.3.

7. Students complete and re-include point 7 into the final activity report according to the activities that have been carried out. The final report and activity evidence documents (certificates, grades, *logbooks*, etc.) are submitted to the study program through the recognition team.

Type of MBKM: Research/Research
Title : Increasing the Turnover or Transactions of Merchants in Traditional Markets through the Solo *Great Sale* Program organized by KADIN

**Table 3.3**. List of MBKM Courses

| No. | Course Content | SKS | Learning Outcomes |
|---|---|---|---|
| 1. | Capita Selekta | 2 | Students can analyze the problems in the economy of the Solo community during the *low season* (economic slowdown) and find solutions to these problems by holding Solo Great Sale events where buying and selling transactions are carried out by participants.<br>The event uses Bank Indonesia's QRIS digital money. |
| 2. | Entrepreneurship | 2 | Students get *hard skills* and *soft skills* by participating in and help include merchants traditional markets in the Solo *Great Sale* program. |
| 3. | Technopreneurship | 2 | Students can collect data trade transactions in traditional markets and then be able to Analyzed. |
| 4. | Simulation Techniques | 3 | Students are able to calculate and analyze trade transaction data of Solo residents who participate in the Solo *Great Sale* program before and after the implementation of the event and present it in the form of<br>narration so that the information can be received easily both to the public and other parties. |
| | Total | 9 | |

An example of a list of MBKM recognition courses is presented in Table 3.4. MBKM internship activities refer to the **Merdeka Learning-Campus Merdeka Internship Guidelines for the Mathematics Study Program FMIPA UNS**. Taking KMM courses as one of the MBKM activity recognition courses still follows the requirements set in the Mathematics Study Program, namely having taken and passed 80 credits. Taking KKN MBKM courses as one of the independent learning activity recognition courses, still refers to the UNS Rector Regulation No. 31 of 2020, namely after achieving a minimum credit of 100 credits. Outputs for KKN MBKM are activity reports, activity SPJ (if any), scientific articles, *logbooks*, activity videos, and press releases for the media.

**Table 3.4**. Sample List of MBKM Recognition Courses

| No. | Activities | Criteria | SKS |
|---|---|---|---|
| 1. | Student Exchange | a. The courses contained in the curriculum structure of the Mathematics Study Program FMIPA UNS which can be in the form of compulsory or elective courses.<br>b. The course credits in the destination study program are not less than the same course credits in the original study program. | |
| 2. | Internship/Practice | a. KMM<br>b. Probabilistic Operations Research<br>c. Mathematical Communication<br>d. Courses other than those in Table 3.2 with SLO alignment | 2<br>2<br>2<br>2 |
| 3. | Teaching Assistance in Unit Education | a. Mathematical Communication<br>b. KKN<br>c. Set Theory<br>d. Courses other than those in Table 3.2 with SLO alignment | 2<br>2<br>2 |
| 4. | Research | a. Capita Selekta<br>b. Research Methodology and Scientific Writing in Mathematics<br>c. Simulation Technique<br>d. Courses other than those in Table 3.2 with SLO alignment | 2<br>2<br>3 |
| 5. | Humanitarian Project | a. KKN<br>b. Courses other than those in Table 3.2 with SLO alignment | 2 |
| 6. | Entrepreneurial Activities | a. Entrepreneurship<br>b. Technopreneurship<br>c. Mathematical Communication<br>d. Game Theory<br>e. Courses other than those in Table 3.2 with SLO alignment | 2<br>2<br>2<br>2 |
| 7. | Independent Study | a. Database Management<br>b. Science Data<br>c. Artificial Intelligence<br>d. Courses other than those in Table 3.2 with SLO alignment | 2<br>3<br>3<br>2 |
| 8. | Building the Village | a. KKN<br>b. Entrepreneurship<br>c. Technopreneurship<br>d. Courses other than those in Table 3.2 with SLO alignment | 2<br>2<br>2 |
| 9. | State Defense | a. Courses other than those in Table 3.2 with SLO alignment | |

# CHAPTER IV. CLOSING

This guidebook is used as a guide for students, study programs and related parties to plan, implement, and evaluate MBKM activities outside the Mathematics Study Program FMIPA UNS. The success of the study program in supporting MBKM activities certainly requires the support of active participation from students, lecturers, and related work unit partners. Therefore, the study program continues to develop cooperation and expand it with activities that support the implementation of the MBKM program. Thus, the programs implemented can be arranged and agreed upon together between the study program and partners.

The purpose of the MBKM program is to improve the competence of graduates, both *soft skills* and *hard skills*, so that they are more prepared and relevant to the times and industry needs. Therefore, students, lecturers, partners and parties involved in MBKM must have the same mission to develop student potential. Thus, students of the Mathematics Study Program FMIPA UNS have a strong character as a superior leaderand personality, and are able to open productive and innovative job opportunities. This book is dynamic and follows policy developments. Therefore, various improvementsmust continue to be made.

# BIBLIOGRAPHY

Merdeka Learning Guidebook - Merdeka Campus. 2020. Directorate General of Higher Education, Ministry of Education and Culture.

Guidelines for Preparing the Higher Education Curriculum in the Industrial Era 4.0 to Support Merdeka Learning - Merdeka Campus. 2020. Directorate General of Higher Education, Ministry of Education and Culture.

Regulation of the Chancellor of Sebelas Maret University Number 31 of 2020 concerning the Implementation and Management of Undergraduate Programs.

Sarwiji Suwandi, et al. 2020. Implementation Guide for Merdeka Belajar-Kampus Merdeka. Surakarta: UNS Press.

**Appendix 1: MBKM Recognition Application Form**

MINISTRY OF EDUCATION, CULTURE, RESEARCH AND TECHNOLOGY
SEBELAS MARET UNIVERSITY
FACULTY OF MATHEMATICS AND NATURAL SCIENCES
**MATHEMATICS STUDY PROGRAM**
Jalan Insinyur Sutami 36A Kentingan Surakarta 57126 Telp./Fax. (0271) 663375
web: mipa.uns.ac.id / e-mail: info@mipa.uns.ac.id

**MBKM Recognition Application Form Mathematics Study Program FMIPA Sebelas Maret University**

**A. STUDENT IDENTITY**

| | | | |
|---|---|---|---|
| 1. | Name | : | |
| 2. | NIM | : | |
| 3. | Semester | : | |

**B. MBKM PROGRAM**

| | | | |
|---|---|---|---|
| 1. | Program Name | : | |
| 2. | Company/Institution Name | : | |
| 3. | Location | : | |
| 4. | Activity Time | | |
| | a. Start date | : | |
| | b. Date completed | : | |
| | c. Number of weeks | : | |
| 5. | Responsible | | |
| | a. Name of Internship Leader | : | |
| | b. DPL Name (UNS) | : | |

**C. ACTIVITY PLAN**

| No. | Activities | | Implementation Time (Duration) |
|---|---|---|---|
| 1. | | | |
| 2. | | | |

**D. Admission of Recognized Courses**

| No. | Course Content | SKS | Semester | Learning Outcomes (ELOs) |
|---|---|---|---|---|
| 1. | | | | |
| 2. | | | | |
| 3. | | | | |
| dst | | | | |

Place, date month year

ttd

Student Name
NIM.

Approved,
Academic Advisor

Place, date, month, year

_____
NIP.

Student Name
NIM.

**Appendix 2: MBKM Recognition Decision Letter**

MINISTRY OF EDUCATION, CULTURE, RESEARCH AND TECHNOLOGY
SEBELAS MARET UNIVERSITY
FACULTY OF MATHEMATICS AND NATURAL SCIENCES
**MATHEMATICS STUDY PROGRAM**
Jalan Insinyur Sutami 36A Kentingan Surakarta 57126 Telp./Fax. (0271) 663375
web: mipa.uns.ac.id / e-mail: info@mipa.uns.ac.id

**Decision Letter of MBKM Recognition of Mathematics Study Program FMIPA Sebelas Maret University**

The recognition team of the Mathematics Study Program FMIPA UNS explained that the MBKM activities carried out by the student groups below:

1. Activity Title : .....
2. MBKM Program : .....
2. Implementation Time : .....

3. Student Name: (attached) NIM : (attached)
   Study Program : Mathematics
   Faculty : Mathematics and Natural Sciences
4. MBKM Activity Supervisor : .....

The list of courses that can be recognized with the proposed MBKM activity is as follows:

| No. | Course Name | SKS | Learning Outcomes (ELOs) |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| | Total | | |

Place, date, month, year
Recognition Team
Mathematics Study Program

Knowing, Head of
Study Program
Math

Dr. Drs. Siswanto, M.Si.
NIP. 196708131992031002

NIP.

**Attachment**

Student Name List

| No. | Name | NIM |
|---|---|---|

**Appendix 3: Letter of Recommendation**

MINISTRY OF EDUCATION, CULTURE,
RESEARCH AND TECHNOLOGY
SEBELAS MARET UNIVERSITY
FACULTY OF MATHEMATICS AND NATURAL SCIENCES
**MATHEMATICS STUDY PROGRAM**
Jalan Insinyur Sutami 36A Kentingan Surakarta 57126 Telp./Fax. (0271) 663375 web: mipa.uns.ac.id / e-mail: info@mipa.uns.ac.id

**RECOMMENDATION LETTER**
No: _____

The undersigned:
Name : Dr. Drs. SISWANTO, M.Si.
Position : Head of Mathematics Study Program FMIPA
NIP 196708131992031002
E-mail : sis.mipa@staff.uns.ac.id
Phone No. 082137983699

approve the attached list of student names to become participants in the Internship and Certified Independent Study program in .....with the following conditions:

1. Students will participate in the Internship Program and Certified Independent Study Year .... fully and responsibly,
2. Students are able to be placed in Certified Internship and Independent Study program partners throughout Indonesia in accordance with the selection results and the consolidation process between the selected student's home study program and the designated Industry Partner,
3. Students are able to travel across districts/cities/provinces/countries if necessary according to the placement set by the Internship and Certified Independent Studyprogram partners with strict observance of health protocols.

In addition to the above, as a form of support and facilitation for students, we express our willingness to:
1. Provide full support and be responsible if something happens during the Internship and Certified Independent Study program in 2021 from the beginning to the end of the program,
2. Supporting student learning through Internships and Year Certified Independent Study experiences ....
3. Provide recognition and conversion of a maximum of 20 credits or things that have become an agreement between the student's home study program and industrial partners for students after program completion.

Thus we submit this recommendation letter to be used as appropriate.

Place, date, month, year Head
of Mathematics Study Program

Dr. Drs. SISWANTO, M.Si.
NIP. 196708131992031002

**Student Name List**
**Certified Internship and Independent Study Program Participants Year .....**

| No. | NIM | Name | Study Program | Faculty | Semester | Partner Name |
|---|---|---|---|---|---|---|
| 1. | | | | | | |
| 2. | | | | | | |
| 3. | | | | | | |