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Publisher: Unib Press
Volume 3 number 1, Mei 2024
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Analysis of the Achievement of Program Learning Outcomes Based on an Outcome-Based Education Curriculum

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Abstract

The curriculum, a set of plans and arrangements for learning outcomes, study materials, processes, and assessments, serves as a guide for implementing study programs. The Outcome Based Education (OBE) curriculum has been adopted at the higher education level to keep pace with rapid technological developments. Program Learning Outcomes (PLOs) are designed to articulate learning objectives into measurable and assessable statements using OBE principles. The results of PLO evaluations can be used to enhance PLO standards or quality performance and for accreditation purposes. Syarif Hidayatullah State Islamic University Jakarta has implemented the OBE curriculum in study programs in a significant stride towards international accreditation. This research, conducted using a quantitative research method, aims to analyze the achievement of the PLOs established by the Bachelor of Mathematics Study Program, Faculty of Science and Technology, Syarif Hidayatullah State Islamic University Jakarta. The research method involves measuring the achievement of PLOs by analyzing student grades and providing a comprehensive and objective assessment of the PLOs established by the Bachelor of Mathematics Program. The achievement of PLOs in the Bachelor of Mathematics Study Program, Faculty of Science and Technology, Syarif Hidayatullah State Islamic University Jakarta, is a significant 85.11%.

Keywords: PLO, OBE, Mathematics

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Introduction

The curriculum is the primary foundation of the education system, consisting of a series of plans and arrangements regarding learning outcomes, learning materials, processes, and assessments (Peraturan Menteri Pendidikan Dan Kebudayaan Republik Indonesia Nomor 49 Tahun 2014 Tentang Standar Nasional Pendidikan Tinggi, 2014). As a guide for implementing study programs, the curriculum plays a crucial role in ensuring that the education provided aligns with the established objectives (Wijngaards-de Meij & Merx, 2018). In recent decades, rapid technological advancements have driven the need for curriculum updates, particularly at the higher education. One approach that has been widely adopted is Outcome Based Education (OBE)(Japee & Oza, 2021).

Outcome Based Education (OBE) is an educational approach focusing on student learning outcomes as the main indicator of success (Asim et al., 2021; Syeed et al., 2022). With the OBE principle, learning objectives are articulated in measurable and assessable statements known as Program Learning Outcomes (PLO) (Kushari & Septiadi, 2022; Syeed et al., 2022). These PLOs encompass various aspects of skills and knowledge that students must achieve by the end of the study program (Goss, 2022). Evaluating PLOs not only helps measure student achievements but also serves as a tool for improving education quality through the refinement of PLO standards and accreditation preparation, as practiced by several universities (Akramy, 2021; Arum Tri Rahayu et al., 2022; Damit et al., 2021; Mohayidin et al., 2008; Pradhan, 2021; Tenedero & Pacadaljen, 2021).

Syarif Hidayatullah State Islamic University Jakarta (UIN Syarif Hidayatullah Jakarta) has adopted the OBE curriculum in various study programs to achieve international accreditation. Implementing the OBE curriculum at UIN Syarif Hidayatullah Jakarta marks a significant step in enhancing the quality of education provided and ensuring that graduates possess competencies that meet global standards. One of the study programs implementing the OBE curriculum is the Bachelor of Mathematics program in the Faculty of Science and Technology.

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The Bachelor of Mathematics program at UIN Syarif Hidayatullah Jakarta, under the Faculty of Science and Technology, is dedicated to the development of knowledge and innovation in pure and applied mathematics, data science, and actuarial science, all integrated with Islamic values, humanity, modernity, and nationality. Adopting an Outcome Based Education (OBE) curriculum, the program aims to meet ASIIN accreditation standards, ensuring its graduates possess globally competitive competencies. This approach enhances the educational quality and aligns with the program's vision of being a leading center for mathematical sciences and innovation, deeply rooted in ethical and cultural values.

This research analyzes the achievement of PLOs established by the Bachelor of Mathematics program, Faculty of Science and Technology, UIN Syarif Hidayatullah Jakarta. Using a quantitative research method, this study measures the achievement of PLOs by analyzing student grades. This assessment aims to provide a comprehensive and objective picture of how students have achieved the established PLOs and identify areas that require improvement. The primary research question guiding this study is: "To what extent have students in the Bachelor of Mathematics program at UIN Syarif Hidayatullah Jakarta achieved the Program Learning Outcomes, and what specific areas need enhancement to meet the desired educational standards?".

Research Methodology

The method used in this research is quantitative descriptive research. The purpose of measuring the achievement of PLO is to determine whether the PLO set by the Mathematics Bachelor's Program has been achieved. After mapping the achieved and unachieved PLOs, the program can identify measures for continuous improvement. The measurement of PLO achievement used is the Model Discrepancy evaluation developed by Provus, which compares the program model or plan with the obtained results. Furthermore, the gap between the actual results and the program plan is used to consider whether modifications are necessary.

The stages related to PLO assessment are as follows:

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1. Identification of PLOs: The first stage involves clearly defining and identifying the study program's Program Learning Outcomes (PLOs). These outcomes should align with the program's goals and the skills and knowledge that graduates are expected to possess.
2. Mapping Courses to PLOs: Each course within the program is mapped to specific PLOs. This stage ensures that all PLOs are covered across the curriculum and that each course contributes to achieving relevant outcomes.
3. Development of Assessment Tools: Appropriate tools and methods for assessing the PLOs are developed. This can include exams, projects, presentations, or other forms of evaluation that align with the specific skills and knowledge outlined in the PLOs.
4. Implementation of Assessments: The assessment tools are implemented in the relevant courses. Instructors collect data on student performance related to each PLO during their courses.
5. Data Collection and Analysis: Data from the assessments are collected and analyzed to determine how well students achieve the PLOs. This involves reviewing the assessment results to identify trends, strengths, and improvement areas.
6. Feedback and Improvement: Based on the analysis, instructors and program coordinators receive feedback. This stage uses the assessment data to make informed curriculum and instructional improvement decisions.
7. Reporting: The results of the PLO assessments are documented and reported to relevant stakeholders, including faculty, administration, and accreditation bodies. This reporting helps demonstrate accountability and the program's effectiveness in achieving its learning outcomes.
8. Continuous Review and Adjustment: PLOs and assessment methods are continuously reviewed and adjusted based on feedback and evolving educational standards. This ensures that the program remains relevant and effective in preparing students for their careers.

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By following these stages, the study program ensures a systematic approach to assessing and improving the achievement of its Program Learning Outcomes, ultimately enhancing the quality of education provided to students.

This research utilizes data from student course grades, which are processed and presented in an organized manner. The following steps are taken to process this data:

1. Convert students' numerical grades into weighted letter grades based on the respective letter grade ranges.
2. Calculate the total or frequency of each letter grade for each course.
3. Group courses based on PLO (Program Learning Outcome).
4. Calculate the total number of each letter grade and then calculate their percentages.
5. Present the calculated data in tables and diagrams.
6. Calculate the average of each letter grade across all PLOs and present it in diagram form.

Result and Discussion

The Bachelor of Mathematics Study Program's UIN Syarif Hidayatullah Jakarta curriculum structure, based on the Indonesian National Qualifications Framework (KKNI), consists of 78 courses divided into 3 types: Compulsory Courses, Directed Elective Courses, and Free Elective Courses. The complete breakdown is shown in Table 1.

Table 1. Courses for Bachelor of Mathematics Study Program UIN Syarif Hidayatullah Jakarta

Courses	Symbol	Courses	Symbol
Islamic Studies	MK1	Financial Mathematics	MK40
Practicum Qiraah	MK2	Actuarial Mathematics I	MK41
Indonesian Language	MK3	Survival Analysis	MK42
Pancasila	MK4	Research Methodology	MK43
Arabic Language	MK5	Simulation Techniques	MK44
Calculus I	MK6	Entrepreneurship	MK45
Basic Mathematics Practice	MK7	Design of Experiments I	MK46
Discrete Mathematics	MK8	Artificial Intelligence Methods	MK47
Practicum Worship	MK9	Actuarial Mathematics II	MK48
Civics Education	MK10	Non-Parametric Statistics	MK49
English Language	MK11	Categorical Data Analysis	MK50

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Calculus II	MK12	Spatial Statistics	MK51
Elementary Linear Algebra	MK13	Biostatistics	MK52
Elementary Statistics	MK14	Statistical Computing	MK53
Introduction to Computer Science	MK15	Quality Control Statistics	MK54
Number Theory	MK16	Database	MK55
Islam and Science	MK17	Data Warehouse	MK56
Calculus III	MK18	Graph Theory	MK57
Mathematical Statistics I	MK19	Cryptography	MK58
Introduction to Real Analysis I	MK20	Computer Graphics	MK59
Ordinary Differential Equations	MK21	Digital Image Processing	MK60
Numerical Methods	MK22	Pension Plans	MK61
Introduction to Algebraic Structures	MK23	Risk Theory	MK62
Introduction to Real Analysis II	MK24	General Insurance	MK63
Stochastic Models	MK25	Macroeconomics	MK64
Algorithms and Programming	MK26	Microeconomics	MK65
Partial Differential Equations	MK27	Actuarial Computing	MK66
Mathematical Statistics II	MK28	Community Service Program (KKN)	MK67
Data Structures	MK29	Internship	MK68
Complex Functions	MK30	Structural Equation Models (SEM)	MK69
Analytic Geometry	MK31	Design of Experiments II	MK70
Mathematical Modeling	MK32	Selective Capita in Statistics	MK71
Linear Models	MK33	Introduction to Data Mining	MK72
Multivariate Statistics	MK34	Selective CApita in Computing	MK73
Time Series Analysis	MK35	Financial Computing	MK74
Sampling Techniques	MK36	Insurance Company Operations	MK75
Introduction to Algorithm Analysis	MK37	Selective Capita in Actuarial Science	MK76
Scientific Computing	MK38	Thesis Seminar	MK77
Parallel Programming	MK39	Thesis	MK78

The Bachelor of Mathematics UIN Syarif Hidayatullah Jakarta includes 17 Program Learning Outcomes (PLO) detailed in Table 2. The PLOs are categorized into specific skills, knowledge, general skills, and attitudes. The Program Learning Outcomes (PLO) of the Bachelor of Mathematics Study Program at the Faculty of Science and Technology, Syarif Hidayatullah State Islamic University Jakarta, encompass several categories, including specific skills, knowledge, general skills, and attitudes.

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In the category of specific skills, students are expected to be capable of reconstructing, modifying, and analyzing mathematical problems in a structured manner, assessing their accuracy, and interpreting them (PLO 1, 17 courses). They should also be able to solve real-world problems statistically and present and communicate the results effectively in writing and orally (PLO 2, 11 courses). Additionally, students must be able to analyze, design, and implement computer-based systems to solve problems by applying fundamental mathematics, algorithm principles, and computer theory in mathematical modeling (PLO 3, 9 courses). They should also be capable of designing, conducting, and completing research in mathematics or related disciplines through exploration, logical reasoning, generalization, abstraction, formulation, analysis, and formal proof, with or without software tools (PLO 4, 7 courses). Moreover, students are expected to adapt or develop themselves in mathematics and other relevant fields, including in their professional careers (PLO 5, 2 courses), and solve insurance-related problems (PLO 6, 4 courses).

In the category of knowledge, students must master theoretical concepts of mathematics, including mathematical logic, discrete mathematics, algebra, analysis and geometry, statistics, computational mathematics, and actuarial science (PLO 7, 21 courses). They should also grasp the principles of mathematical modeling, differential equations, numerical methods, algorithm analysis, and survival analysis (PLO 8, 11 courses). In the general skills category, students are expected to understand and apply science and technology integrated with Indonesian and Islamic values (PLO 9, 4 courses) and provide alternative solutions with a leadership attitude, creativity, and communication skills (PLO 10, 8 courses).

In the category of attitudes, students are expected to be devoted to Almighty God (PLO 11, 78 courses) and possess good morals, ethics, and personality in completing tasks (PLO 12, 78 courses). They should also possess nationalism and patriotism and support world peace (PLO 13, 9 courses). Students are also expected to work collaboratively and have high social awareness and concern for society and the environment (PLO 14, 6 courses), respect cultural diversity, perspectives, beliefs, and religions, as well as the original opinions/discoveries of others (PLO 15, 1 course),

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uphold law enforcement and have the spirit to prioritize the interests of the nation and the wider community (PLO 16, 1 course), and be responsible for their work and capable of being entrusted with responsibility for achieving organizational results (PLO 17, 6 courses).

Table 2. PLO for Bachelor of Mathematics Study Program UIN Syarif Hidayatullah Jakarta

PLO	Description	Number of Course	Categories
1	Capable of reconstructing, modifying, analyzing/thinking in a structured manner about mathematical problems of a system/problem, assessing the accuracy, and interpreting it.	17	Specific Skill
2	Capable of solving real-world problems statistically and presenting and communicating the results in an easily understandable form, both in writing and orally.	11	
3	Capable of analyzing, designing, and implementing a computer-based system efficiently to solve problems by applying basic mathematics, algorithm principles, and computer theory in mathematical modeling.	9	
4	Capable of designing, conducting, and completing research under the supervision of a mentor in the field of mathematics or related disciplines through exploration, logical reasoning, generalization, abstraction, formulation, analysis, and formal proof, with or without software tools.	7	
5	Capable of adapting or developing oneself, both in mathematics and other relevant fields (including in their professional career).	2	
6	Capable of solving problems related to the field of insurance.	4	
7	Adept at the theoretical concepts of mathematics, including mathematical logic, discrete mathematics, algebra, analysis and geometry, statistics, computational mathematics, and actuarial science.	21	Knowledge
8	Adept at the principles of mathematical modeling, differential equations, numerical methods, algorithm analysis, and survival analysis.	11	
9	Able to understand and apply science and technology integrated with Indonesian and Islamic values.	4	General Skill

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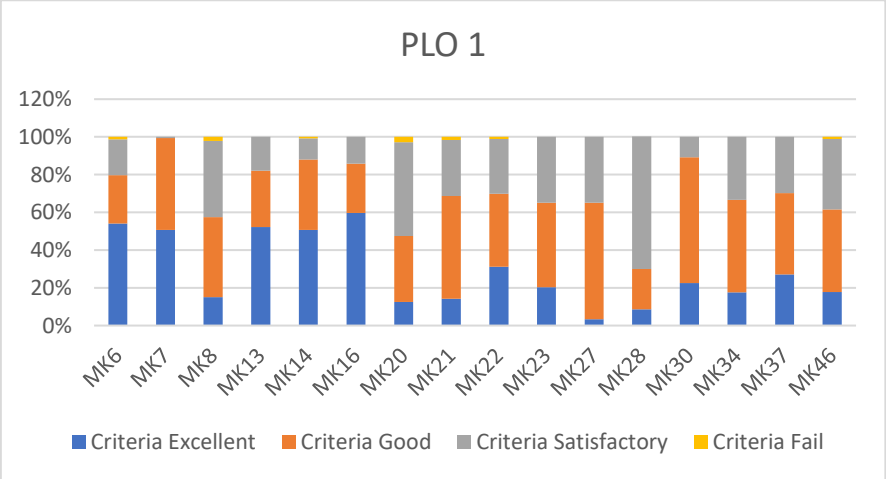
10	Capable of providing alternative solutions with leadership attitude, creativity, and communication skills.	8	
11	Devoted to the Almighty God.	78	
12	Possess good morals, ethics, and personality when completing tasks.	78	
13	Possessing nationalism and patriotism and supporting world peace	9	
14	Possessing the ability to work collaboratively and have high social awareness and concern for society and the environment.	6	
15	Respecting cultural diversity, perspectives, beliefs, and religions, as well as the original opinions/discoveries of others.	1	Attitudes
16	Upholding law enforcement and having the spirit to prioritize the interests of the nation and the wider community.	1	
17	Being responsible for one's work and capable of being entrusted with responsibility for achieving organizational results.	6	

For each course, student grades are converted into five weighted letters: A, B, C, D, and E. The letter A is categorized as Excellent, the letter B as Good, the letter C as Satisfactory, and the letters D and E are categorized as Fail. Based on the grouping of student grade results for each PLO, the following results are obtained:

Table 3. Achievement of PLO 1

Criteria	Persentage
Excellent	44%
Good	37%
Satisfactory	18%
Fail	0%
Total	**100%**



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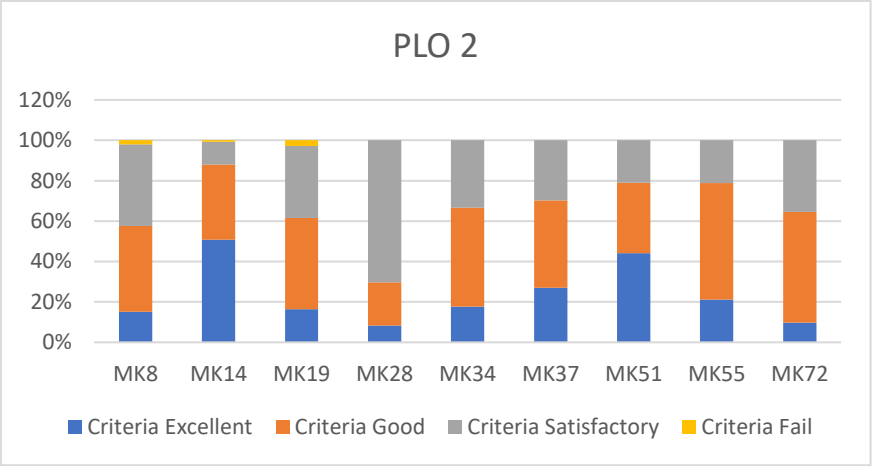
Picture 1. Achievement of PLO 1

From the data provided, it is known that for PLO 1, where students are expected to be able to reconstruct, modify, analyze/think in a structured manner about mathematical problems of a system/problem, assess the accuracy, and interpret it, there are 17 courses with the percentage of students receiving an Excellent grade at 44%, the percentage of students receiving a Good grade at 37%, the percentage of students receiving a Satisfactory grade at 18%, and the percentage of students failing in the course is 0%. In the graph above, the Survival Analysis course (MK42) is not displayed because no students took that course.

Table 4. Achievement of PLO 2

Criteria	Persentage
Excellent	23%
Good	42%
Satisfactory	34%
Fail	1%
Total	**100%**



Picture 2. Achievement of PLO 2

Based on the data provided, it is known that for PLO 2, students are expected to be able to statistically solve real-world problems and present and communicate them effectively, both in writing and orally. There are 11 courses with the following grade distribution: 23% of students received an Excellent grade, 42% received a Good grade, 34% received a Satisfactory grade, and 1% failed.. In the graph above, the courses

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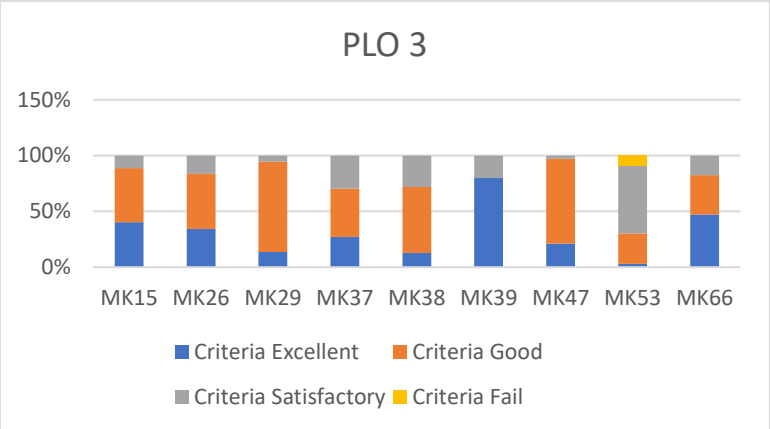
Survival Analysis (MK42) and Data Warehouse (MK56) are not displayed because no students took these courses.

Table 5. Achievement of PLO 3

Criteria	Persentage
Excellent	29%
Good	53%
Satisfactory	17%
Fail	1%
Total	**100%**



Picture 3. Achievement of PLO 3

Based on the provided data, it is known that for PLO 3, students are expected to be able to efficiently analyze, design, and implement computer-based systems to solve problems by applying basic mathematics, algorithm principles, and computer theory in mathematical modeling. There are 9 courses with the following grade distribution: 29% of students received an Excellent grade, 53% received a Good grade, 17% received a Satisfactory grade, and 1% failed.

Table 6. Achievement of PLO 4

Criteria	Persentage
Excellent	72%
Good	26%
Satisfactory	2%
Fail	0%
Total	**100%**

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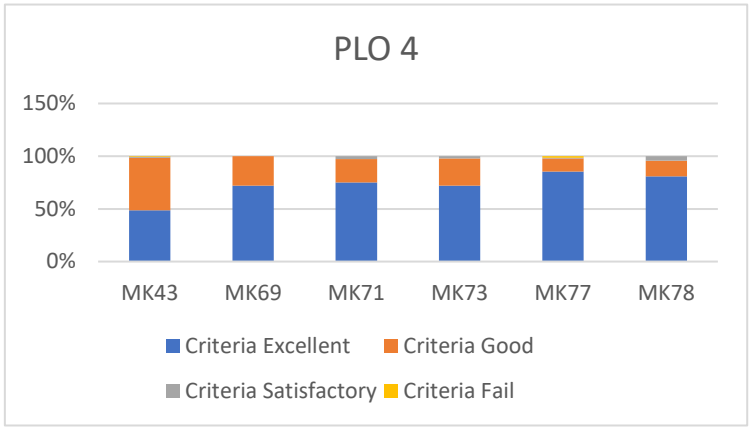
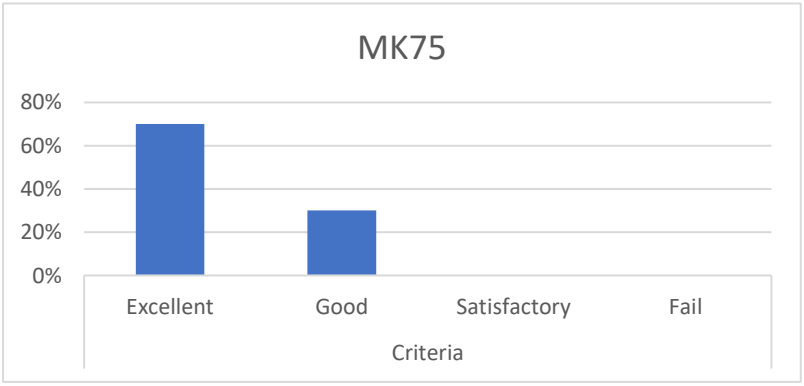


Picture 4. Achievement of PLO 4

From the data provided, it is known that for PLO 4, where students are expected to be able to design, conduct, and complete research under the supervision of a mentor in the field of mathematics or related fields through exploration, logical reasoning, generalization, abstraction, formulation, analysis, and formal proof, with or without the aid of software, there are seven courses with the following grade distribution: 72% of students received an Excellent grade, 26% received a Good grade, 2% received a Satisfactory grade, and 0% failed. In the graph above, the course Simulation Techniques (MK44) is not displayed because no students took this course.

Table 7. Achievement of PLO 5

Criteria	Persentage
Excellent	70%
Good	30%
Satisfactory	0%
Fail	0%
Total	**100%**



Picture 5. Achievement of PLO 5

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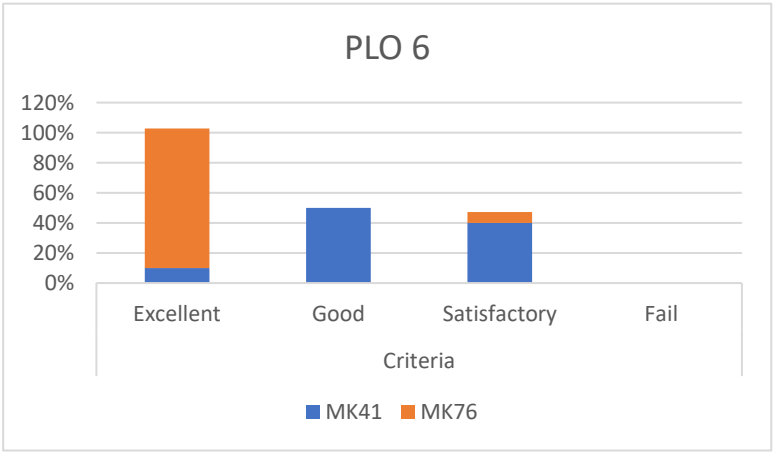
From the data provided, it is known that for PLO 5, where students are expected to be able to adapt or develop themselves, both in the field of mathematics and other relevant fields (including in their professional careers), there are two courses with the following grade distribution: 70% of students received an Excellent grade, 30% received a Good grade, and 0% received a Satisfactory grade or failed. In the graph above, the course Financial Computing (MK74) is not displayed because no students took this course.

Table 8. Achievement of PLO 6

Criteria	Persentage
Excellent	58%
Good	21%
Satisfactory	21%
Fail	0%
Total	**100%**



Picture 6. Achievement of PLO 6

From the data provided, it is known that for PLO 6, where students are expected to be able to solve problems related to the field of insurance, there are four courses with the following grade distribution: 58% of students received an Excellent grade, 21% received a Good grade, 21% received a Satisfactory grade, and 0% failed. In the graph above, Actuarial Mathematics II (MK48) and Actuarial Computing (MK66) are not displayed because no students took these courses.

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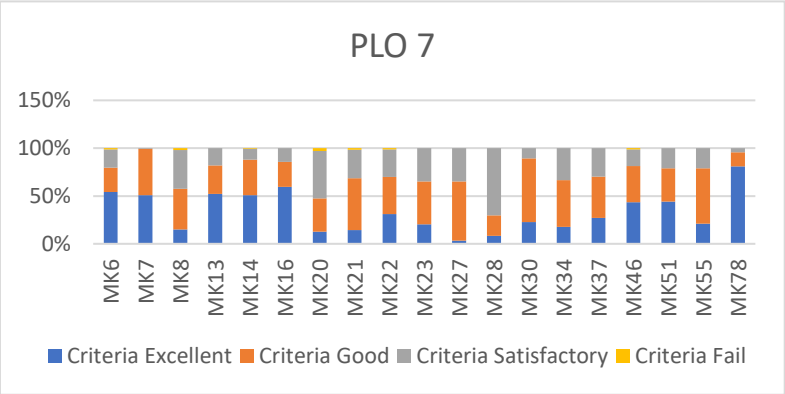
Table 9. Achievement of PLO 7

Criteria	Persentage
Excellent	58%
Good	21%
Satisfactory	21%
Fail	0%
Total	**100%**



Picture 7. Achievement of PLO 7

From the data provided, it is known that for PLO 7, where students are expected to master the theoretical concepts of mathematics, including mathematical logic, discrete mathematics, algebra, analysis and geometry, statistics, computational mathematics, and actuarial science, there are 21 courses with the following grade distribution: 34% of students received an Excellent grade, 40% received a Good grade, 26% received a Satisfactory grade, and 0% failed. In the graph above, the courses Survival Analysis (MK42) and Data Warehouse (MK56) are not displayed because no students took these courses.

Table 10. Achievement of PLO 8

Criteria	Persentage
Excellent	36%
Good	37%
Satisfactory	26,5%
Fail	0,5%
Total	**100%**

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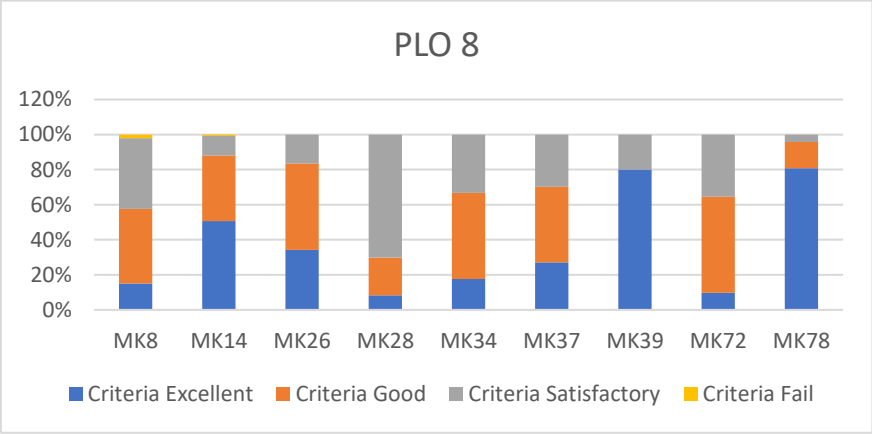
Picture 8.

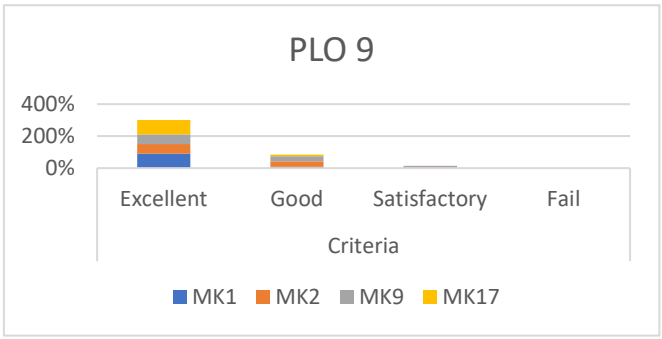


Achievement of PLO 8

From the data, it is known that for PLO 8, where students are expected to master the principles of mathematical modeling, differential equations, numerical methods, algorithm analysis, and survival analysis, there are 11 courses with the following grade distribution: 36% of students received an Excellent grade, 37% received a Good grade, 26.5% received a Satisfactory grade, and 0.5% failed. In the graph above, the courses Survival Analysis (MK42) and Data Warehouse (MK56) are not displayed because no students took these courses.

Table 11. Achievement of PLO 9

Criteria	Persentage
Excellent	76%
Good	21%
Satisfactory	3%
Fail	0%
Total	**100%**



Picture 9. Achievement of PLO 9

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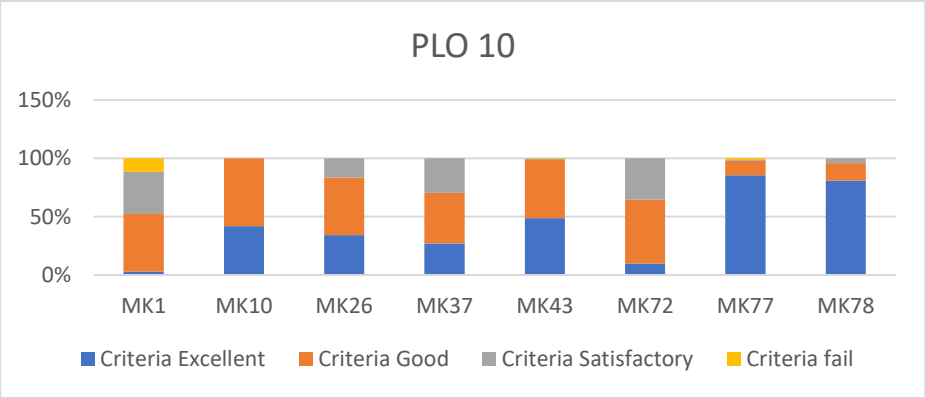
From the data, it is known that in PLO 9, which is the ability of students to understand and apply the sciences and technology integrated with Indonesian and Islamic values, there are four courses with the percentage of students who obtained an excellent grade at 76%, the percentage of students who obtained a good grade at 21%, the percentage of students who obtained a satisfactory grade at 3%, and the percentage of students who failed in the course is 0%.

Table 12. Achievement of PLO 10

Criteria	Persentage
Excellent	76%
Good	21%
Satisfactory	3%
Fail	0%
Total	**100%**



Picture 10. Achievement of PLO 10

From the data, it is known that for PLO 10, which expects students to provide alternative solutions with leadership attitude, creativity, and communication skills, there are 8 courses with the percentage of students who received an excellent grade at 45.4%, the percentage of students who received a good grade at 40.4%, the percentage of students who received a satisfactory grade at 12.2%, and the percentage of students who failed the course at 2%.

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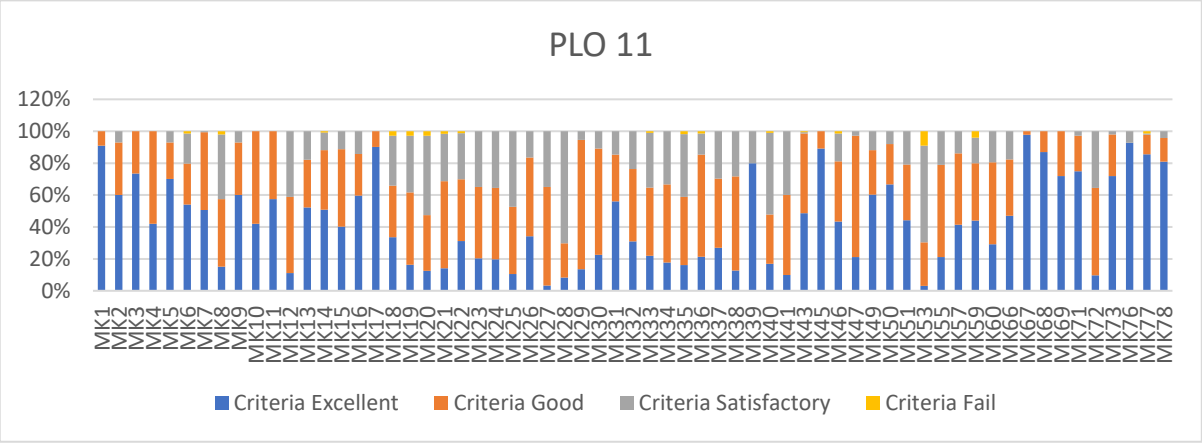
Table 13. Achievement of PLO 11

Criteria	Persentage
Excellent	44%
Good	37%
Satisfactory	18%
Fail	1%
Total	**100%**



Picture 11. Achievement of PLO 11

From the data, it is known that for PLO 11, which expects students to be devout to the Almighty God, there are 78 courses with the percentage of students who received an excellent grade at 44%, the percentage of students who received a good grade at 37%, the percentage of students who received a satisfactory grade at 18%, and students who failed the course amount to 1%.

Table 14. Achievement of PLO 12

Criteria	Persentage
Excellent	44%
Good	37%
Satisfactory	18%
Fail	1%
Total	**100%**

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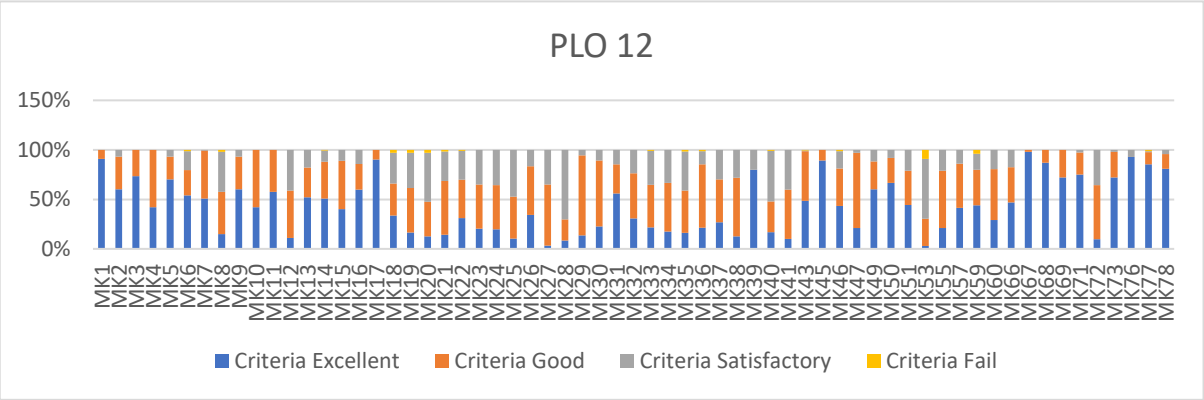
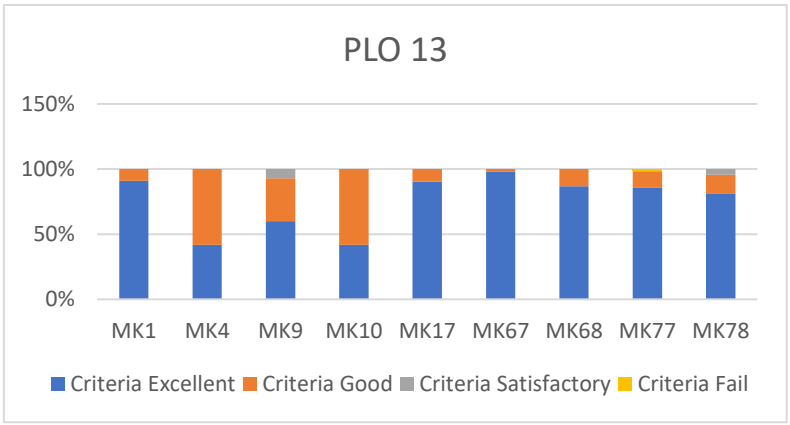


Picture 12. Achievement of PLO 12

From the data, it is known that for PLO 12, which expects students to have good morals, ethics, and character in completing their tasks, there are 78 courses with the percentage of students who received an excellent grade at 44%, the percentage of students who received a good grade at 37%, the percentage of students who received a satisfactory grade at 18%, and students who failed the course amount to 1%.

Table 15. Achievement of PLO 13

Criteria	Persentage
Excellent	75%
Good	23%
Satisfactory	1%
Fail	0%
Total	**100%**



Picture 13. Achievement of PLO 13

From the data, it is known that for PLO 13, which expects students to act as proud citizens who love their homeland and support world peace, there are 9 courses with a

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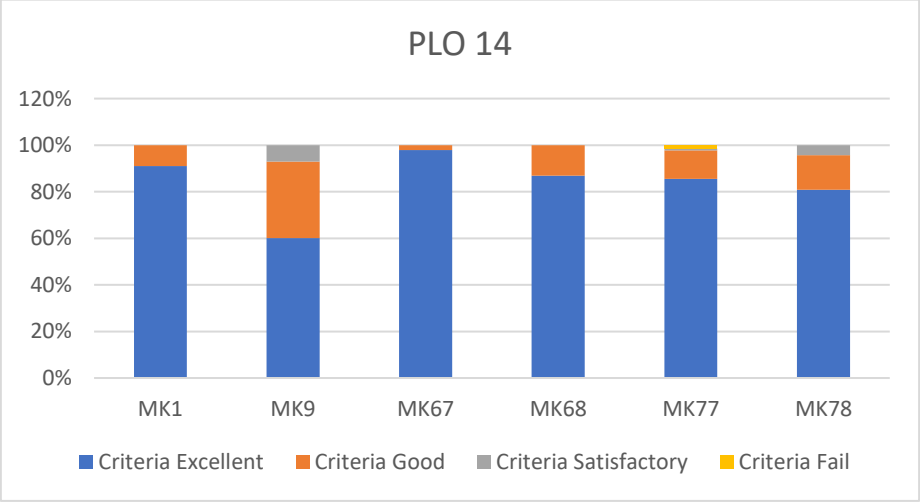
percentage of students who received an excellent grade of 75%, students who received a good grade of 23%, students who received a satisfactory grade of 1%, and students who failed the course by 0%.

Table 16. Achievement of PLO 14

Criteria	Persentage
Excellent	84%
Good	14%
Satisfactory	2%
Fail	0%
Total	**100%**



Picture 14. Achievement of PLO 14

From the data, it is known that for PLO 14, which expects students to be able to work collaboratively and have a high social awareness and concern for society and the environment, there are six courses with a percentage of students who received an excellent grade of 84%, students who received a good grade of 14%, students who received a satisfactory grade of 2%, and 0% of students failed the course.

Table 17. Achievement of PLO 15

Criteria	Persentage
Excellent	81%
Good	15%
Satisfactory	4%
Fail	0%
Total	**100%**

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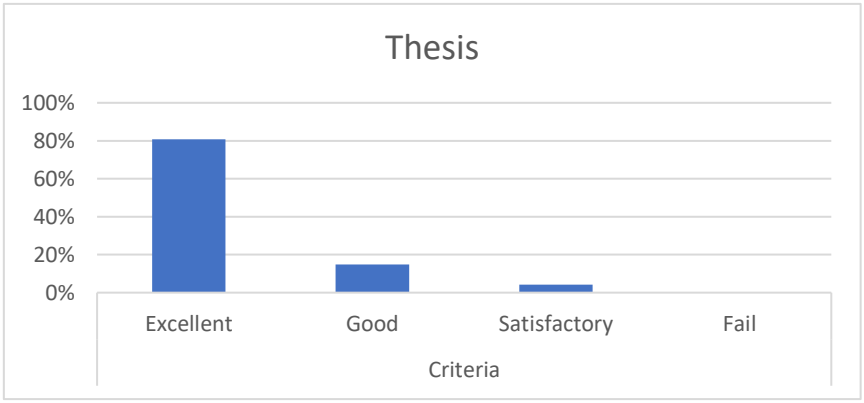
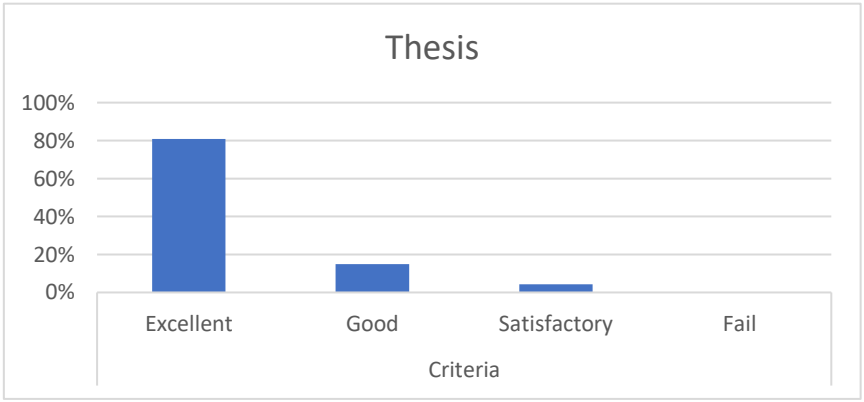


Picture 15. Achievement of PLO 15

From the data, it is known that for PLO 15, which expects students to appreciate cultural diversity, perspectives, beliefs, and religions as well as the original opinions/discoveries of others, there is one course with a percentage of students who received an excellent grade of 81%, students who received a good grade of 15%, students who received a satisfactory grade of 4%, and 0% of students failed the course.

Table 18. Achievement of PLO 16

Criteria	Persentage
Excellent	81%
Good	15%
Satisfactory	4%
Fail	0%
Total	**100%**



Picture 16. Achievement of PLO 16

From the data, it is known that for PLO 16, which expects students to uphold the enforcement of the law and have a spirit of prioritizing the interests of the nation and the

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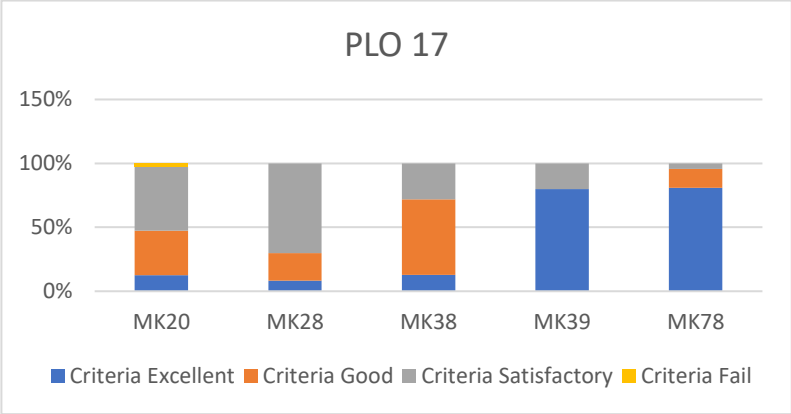
wider society, there is one course with a percentage of students who received an excellent grade of 81%, students who received a good grade of 15%, students who received a satisfactory grade of 4%, and 0% of students failed the course.

Table 19. Achievement of PLO 17

Criteria	Persentage
Excellent	34%
Good	28%
Satisfactory	37%
Fail	1%
Total	**100%**



Picture 17. Achievement of PLO 17

From the data, it is known that in PLO 17, students are expected to be responsible for their own work and can be entrusted with responsibilities for achieving organizational results. There are six courses, with a percentage of students who receive excellent grades at 34%, students who receive good grades at 28%, students who receive satisfactory grades at 37%, and students who fail the course at 1%. In the above graph, the Actuarial Mathematics II course (MK48) is not displayed because no students took the course.

Table 20. PLO Achievement Based on Student Grade Criteria

PLO	Criteria (%)			
	Excellent	Good	Satisfactory	Fail
PLO 1	44	37	16	0
PLO 2	23	42	34	1
PLO 3	29	53	17	1
PLO 4	72	26	2	0

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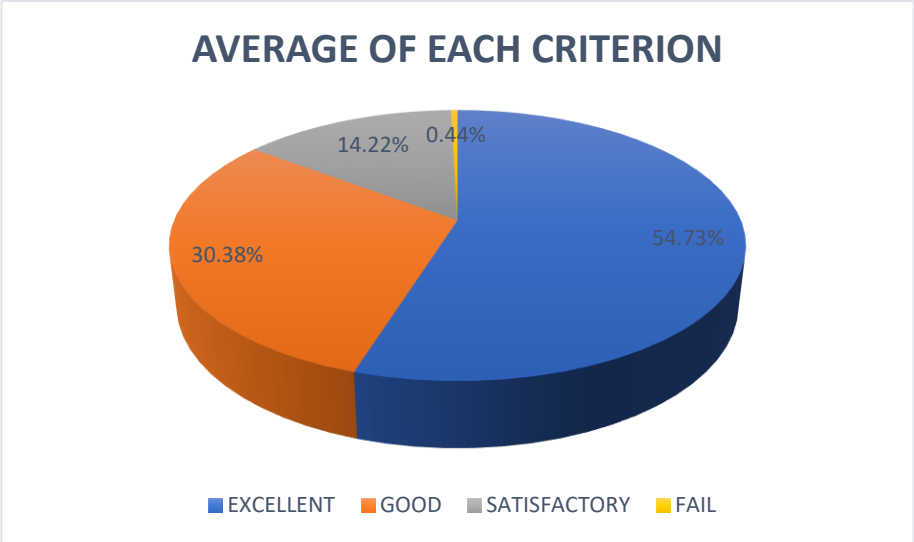
PLO 5	70	30	0	0
PLO 6	58	21	21	0
PLO 7	34	40	26	0
PLO 8	36	37	26,5	0,5
PLO 9	76	21	3	0
PLO 10	45,4	40,4	12,2	2
PLO 11	44	37	18	1
PLO 12	44	37	18	1
PLO 13	75	23	1	0
PLO 14	84	14	2	0
PLO 15	81	15	4	0
PLO 16	81	15	4	0
PLO 17	34	28	37	1
Average	**54,73**	**30,38**	**14,22**	**0,44**



Picture 18. Average of Each Criterion

Table 21. Achievement of PLO by Category

Category	Criteria (%)			
	Excellent	Good	Satisfactory	Fail
Specific Skill	54.73	30.38	14.22	0.44
Knowledge	61.90	28.86	9.14	0.10
General Skill	61.00	33.50	5.50	0.00
Attitudes	63.67	30.83	5.43	0.07

Table 21 presents the achievement of Program Learning Outcomes (PLOs) categorized into specific skills, knowledge, general skills, and attitudes. The table

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displays the distribution of student performance across different criteria within each category. Overall, students demonstrate the highest level of achievement in the "Attitudes" category, followed by "General Skill," "Knowledge," and "Specific Skill" categories.

Table 20 illustrates the distribution of student performance across various Program Learning Outcomes (PLOs), categorized into different criteria: Excellent, Good, Satisfactory, and Fail. This discussion aims to analyze and interpret the findings to gain insights into the effectiveness of the educational program in achieving its intended outcomes.

1. Overall Performance

The average score for the "Excellent" criterion is 54.73%, and the average score for the "Good" criterion is 30.38%, which means the achievement of the Bachelor of Mathematics Study Program PLOs is 85.11%. This suggests a generally high level of achievement among students in meeting the program's learning outcomes.

2. Variability in Achievement

There is notable variability in student achievement across different PLOs. For instance, PLOs 4, 5, 9, 13, 14, 15, and 16 demonstrate high levels of excellence, with percentages ranging from 70% to 84%. Conversely, PLOs 1, 2, 3, 6, 7, 8, 10, and 11 exhibit a more balanced distribution across the criteria, indicating a mix of student performance levels.

3. Strengths and Weaknesses

PLOs 4, 5, 9, 13, 14, 15, and 16 stand out as areas of strength, with a significant proportion of students performing exceptionally well. This suggests the program successfully equips students with the necessary knowledge and skills. Conversely, PLOs 1, 2, 3, 6, 7, 8, 10, 11, and 12 show a more varied distribution across the criteria, indicating potential areas for improvement.

4. Implications for Curriculum and Teaching

The data highlights the importance of continued evaluation and refinement of the curriculum and teaching methodologies to address areas of weakness and enhance student performance. This may involve revising course content, adjusting assessment methods, and providing additional support to students in areas where they struggle.

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5. Future Directions

Moving forward, educators need to use this data-driven approach to inform decision-making and drive improvements in the educational program. By identifying strengths and weaknesses in student achievement, educators can tailor interventions and strategies to optimize learning outcomes and better prepare students for their academic and professional endeavors.

In conclusion, analyzing student performance across different Program Learning Outcomes provides valuable insights into the effectiveness of the educational program. By addressing areas of weakness and building on strengths, educators can enhance overall student achievement and ensure the program's continued success in meeting its intended outcomes.

Conclusion

The Bachelor of Mathematics Study Program at the Faculty of Science and Technology, Syarif Hidayatullah State Islamic University Jakarta, has 17 Program Learning Outcomes (PLOs). Based on the grades obtained by students in all courses, the average result of students with an "excellent" grade is 54.73%, the average result of students with a "good" grade is 30.38%, the average result of students with a "satisfactory" grade is 14.22%, and the average result of students who failed in the course is 0.44%. Therefore, it can be concluded that the achievement of PLOs in the Bachelor of Mathematics Study Program at the Faculty of Science and Technology, Syarif Hidayatullah State Islamic University Jakarta, is 85.11%.

However, some PLOs show lower levels of achievement, particularly in the "Satisfactory" and "Fail" categories. This suggests room for improvement in teaching methods, curriculum, or additional support for students who may require it. Therefore, the proposed recommendations for improvement are essential, including curriculum review, enhanced teaching methods, development of academic guidance programs, strengthening collaboration with industry, and regular evaluation of student performance. By taking appropriate corrective measures, it is expected that the Bachelor

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of Mathematics Study Program can continue to enhance the quality of education offered and better prepare students for real-world challenges and the job market.

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