

## Reviewing curriculum towards ASIIN international accreditation using analytical hierarchy process

Angga Dwi Mulyanto\*, Dwi Suheriyanto, Akyunul Jannah, Tarranita Kusumadewi, Sri Harini, Elly Susanti

Universitas Islam Negeri Maulana Malik Ibrahim Malang, Jl. Gajayana 50, Malang, Jawa Timur 65144, Indonesia

\*Corresponding E-mail: [angga.dwi.m@mat.uin-malang.ac.id](mailto:angga.dwi.m@mat.uin-malang.ac.id)

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### ABSTRACT

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This research focuses on studying the curriculum of three study programs at the Faculty of Science and Technology, namely Biology, Informatics Engineering and Architectural Engineering. The purpose of this research is to see how ready the curriculum of the three study programs is to be submitted as ASIIN international accreditation material. The method used to measure curriculum readiness is using AHP. The results of this study are that from 3 study programs that have been assessed using AHP, the study program that is most ready for its curriculum is Informatics Engineering with a readiness of 73.4%, followed by Architectural Engineering, and after that Biology.

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## Introduction

Industrial revolution 4.0 like nowadays is also affecting the educational world in Indonesia where the management of higher education institutions is facing world phenomena which are volatile, uncertain, complex and ambiguous (VUCA). There are no other options for higher education institutions except to change, transform to be more adaptive and agile, quickly adapting so that public's (college students) trust remains maintained.

The global challenge to create sustainable development goals also forces the higher education institution to take the central role. The globalization and economic current which is moved by innovation and knowledge-based economy can be used as a framework in selecting the development direction of higher education institutions in each country (Salmi, 2009).

Align with that condition, as one of the biggest public Islamic higher education institutions in

Indonesia, Universitas Islam Negeri (UIN) Maulana Malik Ibrahim Malang must be able to take the role in educational field which was entrusted according to constitution and still considering the current development so that being able to compete with other higher education institution in national and international level. According to strategic planning of UIN Maulana Malik Ibrahim for 2021-2030 which is entering the International Reputation phase, where all ongoing activities must support an international level university or commonly known as World Class University (WCU). WCU can be used as a medium to measure the higher education institution quality. According to Webometrics data in 2021, on global scale, UIN Maulana Malik Ibrahim was at 5881st world ranks and 99th in national level, based on UniRank parameter in 2021, UIN Maulana Malik Ibrahim was at 9th position (Top Islamic University in The World) from 482 Islamic University around the world.

There is much research related to higher education institution quality improvement. One of the researches is about the need for educational improvement in higher education institutions (Asmawi, 2005). The quality improvements were based on organizing the infrastructure, human resources, technology mastery and reorganizing the existing organization system which correlated to quality improvement of higher education institution alumni. There was also research related to structural equality estimation model based on exploration data to institutional effect of bachelor's US News and World Report to higher education institution reputation evaluation (Bastedo and Bowman, 2010). This research found that higher education institution's rank had a significant impact on alumni absorption at the job market. Bornmann, Mutz and Daniel in 2003 measured scientific performance of an institution based on Leiden Ranking (LR) data using the Regression StepWise method. LR Data analysis results showed that only 5% of variation total was caused by university difference and around 80% variation between universities could be explained by countries' differences. Finding of this research implied the significant difference between international reputable and non-international reputable universities (Bornmann et al., 2013).

Daraio, Bonaccorsi and Simar in 2015, ranked universities based on 4 aspects which were: mono-dimensionality, statistical endurance, university condition dependency and curriculum structure. The research result concluded that a higher education institution integrated and accessible database system could increase higher education institution reputation (Daraio et al., 2015). Pratiwi, Purwanggono and Bakhtiar in 2007 synchronised the Performance Indicator (PI) of Diponegoro University as one of the important parts of strategic planning to measure the success in one period of leadership. The existing PI at the moment was considered not yet efficient since it impacted the decreasing national and international rank of Diponegoro University. The tighter competition between institutions, a higher education institution must be able to improve their competitiveness at national and international level. The PI harmonization research result with one of evaluation criteria was QS World University Ranking showed that 15 PI were not aligned with QS, and there were 17 sub criteria of QS which were not aligned with PI. Compared to other 13 QS criteria, an internationalization criterion was the highest (Pratiwi et al., 2017).

To support the policy of improvement on campus management digitally based (Smart University) and according to strategic planning of UIN Maulana Malik Ibrahim Malang 2021-2030 which entering International Reputation phase, therefore the Science and Technology Faculty on 2022-2025 are willingly to propose an international level accreditation known as "Akkreditierungsagentur für Studiengänge der Ingenieurwissenschaften, der Informatik, der Naturwissenschaften und der Mathematik" or ASIIN. ASSIN is the international accreditation body located in Germany specialised for manipulation of farming, biology, mathematics and science. ASIIN is based on Outcome Based Accreditation (OBE).

On ASIIN accreditation, a study program must have conducted a learning process to achieve

4 competencies promised. Aside from that, a study program also must implement OBE based education, and show the result of achievement evaluation from the program outcome or known as Program Learning Outcome (PLO). It is expected that the result achieved has supported the success of life improvement personally and socially, also professionally from alumni or known as Programme Educational Objectives (PEO).

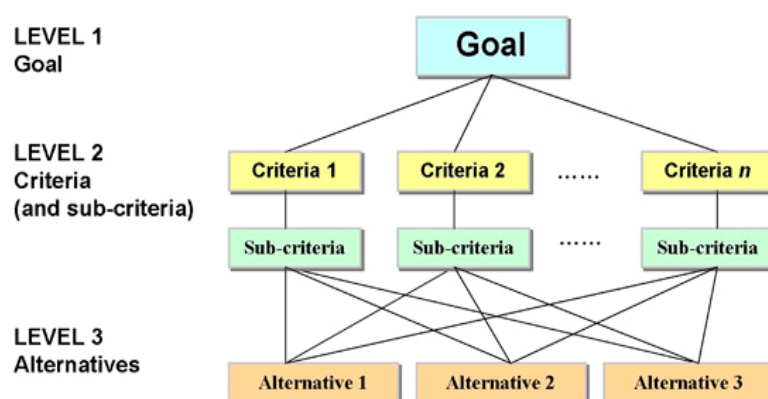
To accomplish the ASIIN international accreditation, therefore the learning system in Science and Technology Faculty will implement standardised OBE according to ASIIN standard. Documents like curriculums, forms or known as Self Evaluation Report (SER) are arranged according to OBE. PLO must be equivalent with ASIIN. Meanwhile, PLO can be taken by fulfilling criteria in Indonesia Qualification Framework (IQF) refers to Regulation of The Minister of Education And Culture No 3, 2020 about Higher Education National Standard. According to it, therefore in this research there was curriculum alignment according to ASIIN measurement criteria conducted.

## Method

The data was collected from the Biology, Informatics Engineering and Architecture Engineering curriculum program which will create a database system which is aligned with the international accreditation standard, ASIIN.

The analysis used was Analytical Hierarchy Process (AHP). Analytical Hierarchy Process or commonly known as AHP, was introduced by a mathematic expert from Wharton Business School, around 1971-1975 by Thomas L Saaty (Dodevska et al., 2023; Karczmarek et al., 2021; R. Saaty & Mu, 2022; Stofkova et al., 2022). The point is, AHP is one of the measurement methods using a pairwise comparison approach and considered by the experts to be prioritized (Kędzior & Kułakowski, 2022; F. Liu et al., 2020; Y. Liu et al., 2020; Nedashkovskaya, 2022). It made AHP one of the decision-making methods which is popular to be used nowadays. In AHP, we set the priority, therefore the decision-making process will be simpler and faster. Sure, the imagination, knowledge and experience aspect from an expert is highly required to arrange the hierarchy and consider the load (T. L. Saaty & Katz, 1994). AHP has the following principle (Latifah, 2005): (1) decomposition, (2) comparative judgement, (3) synthesis of priority, and (4) logical consistency. Meanwhile the AHP steps are: (1) set the goal, (2) create criteria and sub criteria in the hierarchy format, (3) define alternatives, and (4) do pairwise comparison by considering comparative judgement.

AHP design concept is presented in Figure 1.



**Figure 1.** Hierarchy Framework

The AHP creation involves an assessor or expert in international accreditation ASIIN. After the hierarchy concept has been completely made, Analytical Hierarchy Process (AHP) is conducted

to define if the study programme curriculum in Science and Technology Faculty has or has not proper to be proposed for international accreditation.

## Results and discussion

Since none from our team nor from UIN Maulana Malik Ibrahim Malang has connection to ASIIN, therefore we plan to learn at universities in Indonesia that have been through the ASIIN assessment process. From some of universities colleague that had been go through ASIIN assessment, we finally have three locations for learning, which are:

1. Mathematics Program of Sepuluh November Institute of Technology;
2. Mathematics Program of State University of Malang;
3. Biology Program of Brawijaya University Malang.

From the activities above, there are several things to be considered in arranging ASIIN based curriculum, such as:

1. Arranged in English;
2. Contain Programme Study objective;
3. Contain alumni profile;
4. Contain profession;
5. Contain Learning Outcome (LO) of Programme Study;
6. Contain alignment between LO vs National Standard of Directorate General of Higher Education;
7. Contain alignment between LO vs alumni profile;
8. Contain alignment between LO vs Subject-Specific-Criteria (SSC) ASIIN;
9. Distribution all Learning Subject (LS) to LO;
10. Information of amount of mandatory and elective LS and the distribution;
11. Study Program's Group of Expertise (GE);
12. Information about elective LS related to GE;
13. Study Program's Data Student Mobility (both outbound or inbound);
14. Conversion from credit course to European Credit Transfer and Accumulation System (ECTS);
15. Credit course distribution to each semester;
16. Information on how students set up Course Selection Course (CSC) per semester;
17. LS with practice (percentage and credit course);
18. Curriculum set has fulfilled the target (so the students will graduate in 8 semester), proofed with graduated students' percentage in 8 or 7 semester.

Based on the 18 points to be considered in arranging ASIIN based curriculum, then we use the 18 points above as reference in arranging the criteria. The AHP criteria arrangement result in Expert Choice software is presented in Figure 2.

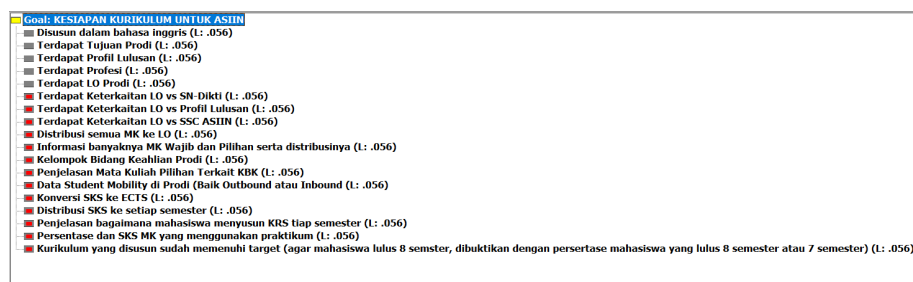


Figure 2. Hierarchy in expert choice program

We assume that the 18 points above are equally important so that we use the same weight for all points. The following is pairwise matrix numerical comparison using the same weight for the 18 criteria above (See Figure 3).

	Dibaca di	Terdapat T	Terdapat P	Terdapat L	Terdapat K	Terdapat K	Distribusi	Informasi	Kelompok	Penjelasan	Data Studi	Konversi S	Distribusi S	Penjelasan	Perentase Kurikulum	
Dibaca dalam bahasa Inggris	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Terdapat Tujuan Pembelajaran	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Terdapat Prinsip Pembelajaran	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Terdapat Prinsip Pembelajaran	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Terdapat L.D Prinsip	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Terdapat Keterampilan LO vs. CMC/CM	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Terdapat Keterampilan LO vs. Prinsip Pembelajaran	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Terdapat Keterampilan LO vs. SSC/ASIN	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Distribusi sesuai MK ke LO	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Memahami banyaknya MK Wajib dan Pilihan serta distribusinya	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Kelompok Bidang Keahlian Prinsip	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Penjelasan Mata Kuliah Pilihan Terkait KDK	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Data Student Mobility di Prinsip Belajar Dubound atau Inbound	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Konversi SKS ke ECTS	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Distribusi SKS ke setiap semester	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Penjelasan bagaimana mahasiswa menyusun KRS tiap semester	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Dikemas dan SKS MK yang menggunakan praktikum	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Kurikulum yang disusun sudah memenuhi target belajar mahasiswa lulus 8 sem	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Figure 3. Matrix pairwise numerical comparison

The following is AHP result for Biology Study Programme, Informatics Engineering and Architecture Engineering (See Figure 4 to Figure 9).

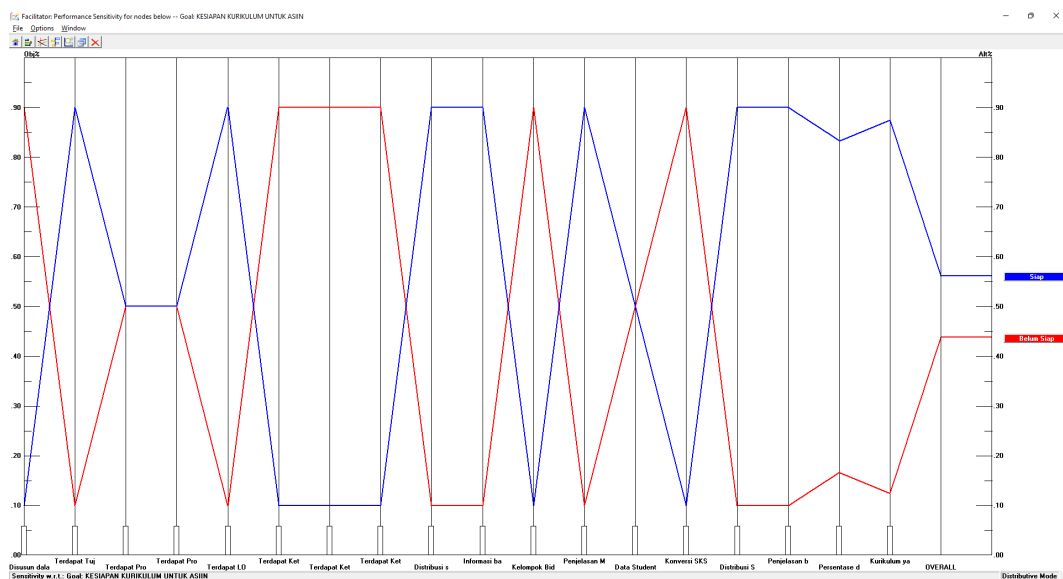


Figure 4. Performance sensitivity biology curriculum

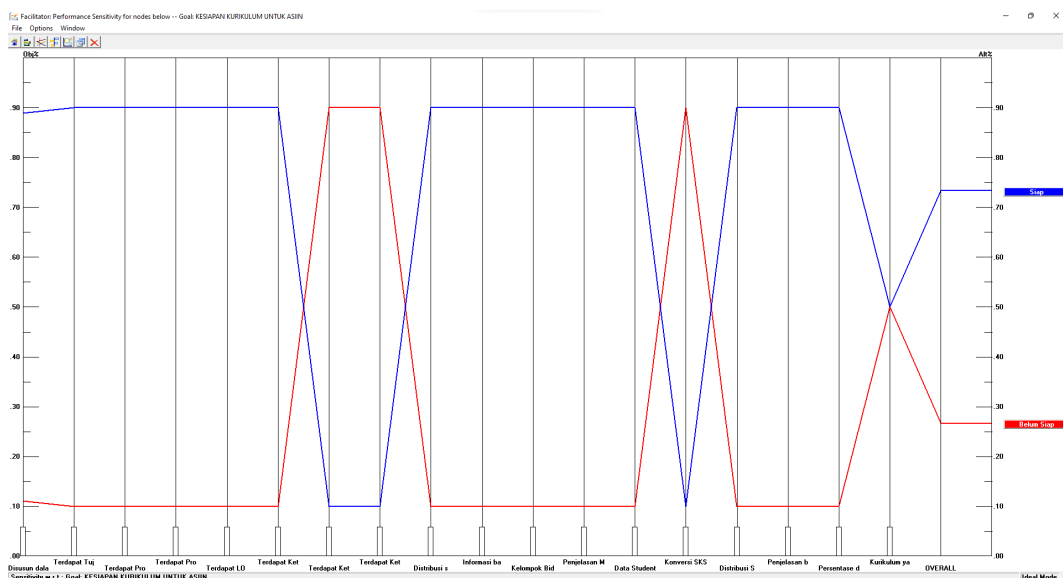


Figure 5. Performance sensitivity informatics engineering curriculum

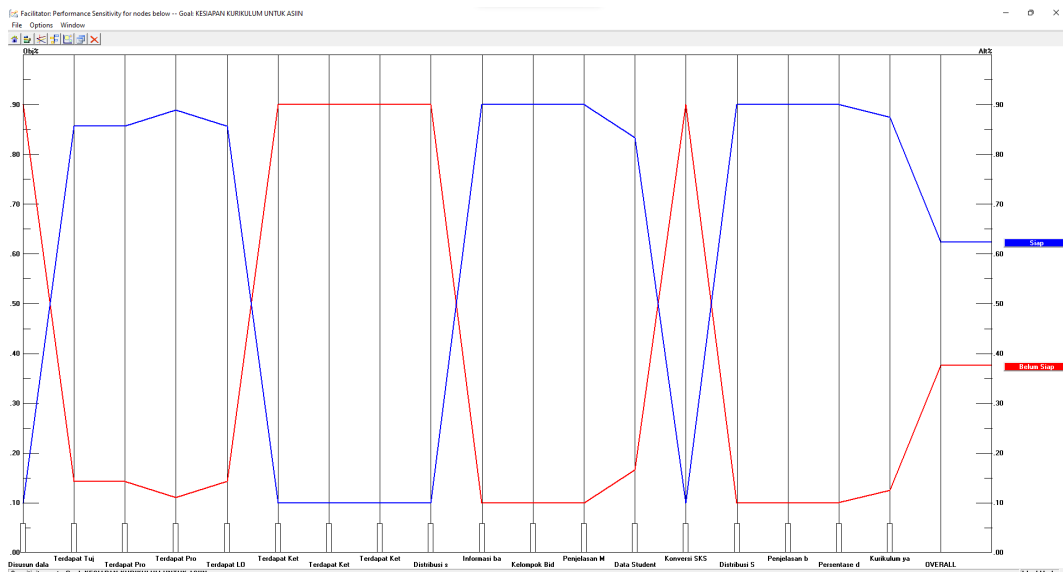


Figure 6. Performance sensitivity architecture engineering curriculum

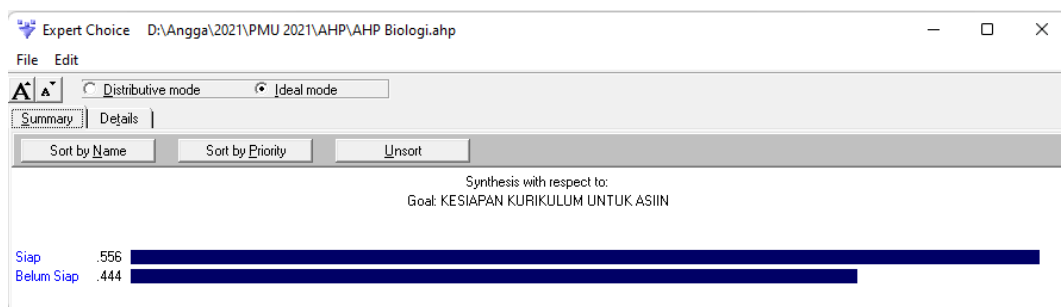


Figure 7. Overall result of biology curriculum AHP

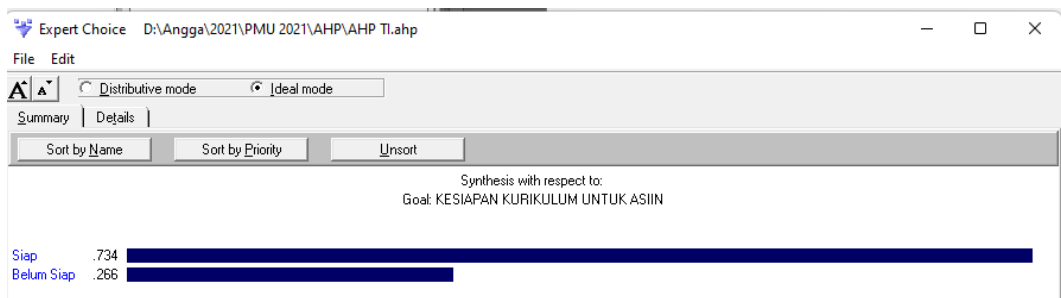


Figure 8. Overall result of informatics engineering curriculum AHP

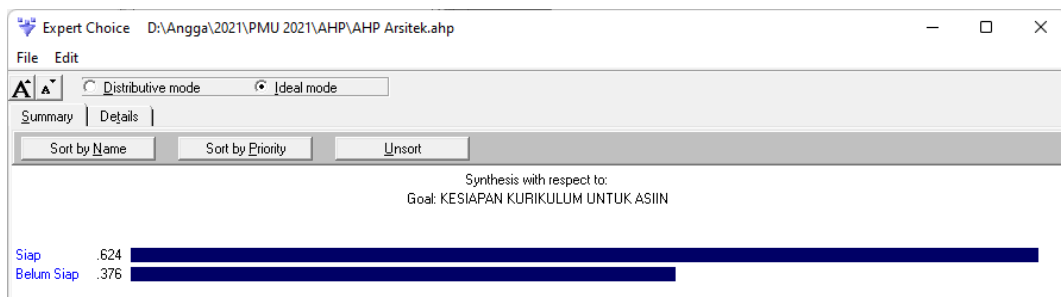


Figure 9. Overall result of architecture engineering curriculum AHP

Based on Figure 7, 8 and 9, it can be seen that overall, the curriculum of Biology Study Program still achieved 55.6% for fulfilling ASIIN curriculum requirements. Based on the above pictures, it can be seen that overall, the curriculum of the Informatics Engineering Study Program still achieved 73.4% for fulfilling ASIIN curriculum requirements. Based on the above pictures, it can be seen that overall, the curriculum of Architecture Engineering Study Program still achieved 62.4% for fulfilling ASIIN curriculum requirements.

Among the three Study Programmes evaluated for ASIIN accreditation, Informatics Engineering demonstrates the highest readiness, with a score of 73.4%. The Biology Study Programme, however, presents various areas for improvement, such as the lack of documentation in English, incomplete alumni profiles, and misalignment of Learning Outcomes (LOs) with national standards. Additionally, gaps in curriculum details, student mobility data organization, and the conversion of course credits to the European Credit Transfer and Accumulation System (ECTS) format are noted.

The Architecture Engineering Study Programme also shows a mixed level of preparedness. While the online documentation includes English, the physical documents do not. The Study Programme has clear objectives and alumni profiles, and its LOs align with national standards. However, similar to the Biology programme, it lacks a comprehensive LO comparison table, has incomplete alignment to SSC ASIIN, and needs to address issues in credit course conversion to ECTS and student graduation timelines.

Informatics Engineering, while leading in overall readiness, still faces challenges. Its online documentation is not in English, and there are gaps in the completion and detailing of alumni profiles and professions. The LOs are not aligned with national standards and SSC ASIIN, and there's a lack of distribution of Learning Spaces (LS) to LOs. Issues in student mobility data organization, credit course conversion to ECTS, and the arrangement of Curriculum-Specific Components (CSC) for LS using practice are also evident. Despite these challenges, a significant number of students graduate within 8 semesters, indicating a curriculum close to meeting its targets.

## **Conclusion**

From all the three study programs measured using AHP, the study program with the highest level of readiness is Informatics Engineering with readiness score 73.4%, followed by Architecture Engineering with 62.4% and Biology with 55.6%. Biology and Architecture Engineering must prepare documents in English while Informatics Engineering has an online curriculum that can be set to English or Bahasa Indonesia. Though LO has been available, it still needs adjustment to the National Standard of Directorate General of Higher Education and also needs to be aligned with alumni's profile and ASIIN SSC. The important point which also needs to be done is converting the credit course to ECTS. All study programs have not conducted the conversion. Student mobility data need to be improved for Biology and Architecture Engineering. Learning course percentage needs to be made regarding learning course use practice. In Architecture Engineering and Biology there are many students who graduate in 8 semesters, however this area becomes Informatics Engineering homework since there are still many students who have graduated more than 8 semesters.

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