ASIIN Seal

Accreditation Report

Bachelor's Degree Program
Mathematics

Master's Degree Program
Mathematics

Provided by
Universitas Andalas

Version: 15.07.2024

Table of Content

A About the Accreditation Process

Name of the degree programme (in original language)	**(Official) English translation of the name**	**Labels applied for** [1]	**Previous accreditation (issuing agency, validity)**	**Involved Technical Committees (TC)**[2]
Program Studi Sarjana Matematika	Mathematics Bachelor Program	ASIIN	BAN-PT 2023-2026, Excellent	12
Program Studi Magister Matematika	Mathematics Master Program	ASIIN	BAN-PT 2020-2025, Grade B	12
Date of the contract: 27.03.2023 **Submission of the final version of the self-assessment report:** 20.10.2023 **Date of the onsite visit:** 20.–21.02.2024 **at: Padang Campus**				
Expert panel: Prof. Dr. Thomas Götz, Universität Koblenz Prof. Dr. Martin Buhmann, Justus-Liebig Universität Gießen Betty Handayani, Director at PT. Epsylon Citra Informatika Richie Mayandel Valerio, master student at Institut Teknologi Bandung				
Representative of the ASIIN headquarter: Andrea Kern				
Responsible decision-making committee: Accreditation Commission for Degree Programmes				
Criteria used:				

[1] ASIIN Seal for degree programs

[2] TC: Technical Committee for the following subject areas: TC 12 - Mathematics.

European Standards and Guidelines as of May 15, 2015 ASIIN General Criteria, as of December 10, 2015 Subject-Specific Criteria of **Technical Committee 12 – Mathematics as of December 9, 2016**	

B Characteristics of the Degree Programs

a) Name	Final degree (original/English translation)	b) Areas of Specialization	c) Corresponding level of the EQF[3]	d) Mode of Study	e) Double/Joint Degree	f) Duration	g) Credit points/unit	h) Intake rhythm & First time of offer
Mathematics Bachelor Programme	S.Si. / B.Sc. (Sarjana Sains / Bachelor of Science)	1. Algebra 2. Analysis and Geometry 3. Combinatorics Mathematics 4. Applied Mathematics 5. Statistics and Probability Theory	6	Full time	-	8 Semester	144 credits /217.44 ECTS	August, annually 1996
Mathematics Master Programme	M.Si. / M.Sc. (Magister Sains / Master of Science)	1. Algebra 2. Analysis and Geometry 3. Combinatorics Mathematics 4. Applied Mathematics 5. Statistics and Probability Theory	7	Full time	-	4 Semester	40 credits / 60.4 ECTS credits	February and August (Twice a year) 2008

The Universitas Andalas (English: Andalas University, UNAND) in Padang (West-Sumatra) is a public university founded in 1956 and represents the oldest Indonesian university outside of main island Java. Since 2021, UNAND has initiated the process to become an autonomous university independent in defining its own standards for education, research and innovation. UNAND operates three campuses with one campus in Padang (Campus I Unand), one in Payakumbuh (Campus II Unand) and one in Dharmasraya (Campus III Unand). According to the national accreditation agency, UNAND as an institution has received a seal of excellence (BAN-PT, until 2028) and ranks 11th in Indonesia in the national SINTA ranking. The representative of the rector's office emphasize during the discussions that UNAND is motivated to increase its position in international university rankings, which is also one reason it seeks international program accreditations. As a second aspect, UNAND wants to provide a stronger international environment at the university at global standards. Although UNAND already engages with a high number of partners, especially in Malaysia, Japan, USA, Taiwan, Nepal, Vietnam, UK and the Philippines, it continues to search for new opportunities including partners in industry and governmental agencies.

[3] EQF = The European Qualifications Framework for lifelong learning

Currently, 33,569 students are enrolled at UNAND within 144 study programs (vocational, Ba, Ma, PhD, and special programs). UNAND employs 1,596 academic staff members, of which 643 are doctors and 178 have reached the rank of professors, supported by 1,447 staff members. Out of 144 study programs, 70 been characterized as excellent in national accreditations. In addition, currently 18 study programs received international accreditations with various agencies.

To proceed in UNAND's internationalization strategy, UNAND plans to invite more students from abroad and increase the number of visiting professors. This includes developing a higher number of student exchange programs and international double degrees. Moreover, UNAND organizes non-degree training (e.g. summer schools) for foreign and Indonesian students join courses on their campus. As example, representatives of the rector's office mention a summer school on entrepreneurship, which was taught by visiting lecturers and UNAND's staff during the last off-semester period. The representatives of the rector's office acknowledge that UNAND still needs to expand its facilities to become internationally competitive; therefore, it currently invested in campus equipment such as teleconference rooms, computer labs and new laboratories. Thus, UNAND follows its strategy to develop towards international standards in education and research.

The representatives of the rector's office describe the international accreditation in the bachelor and master *Mathematics* program as a significant process to verify the quality of the education programs. These programs are considered as the strongest in the Faculty of Natural Science and Mathematics as they continued to receive highest ranks in the national accreditation.

For the bachelor study program, *Mathematics* the institution has presented the following profile on the study programs' webpage (accessed 08.04.2024):

Vision:

To become a reputable study program in the field of theoretical and applied mathematics at the Southeast Asian level in 2028.

Mission:

1. To organize qualified education, effective and efficient
2. To carry out mathematical research activities both basic and applied to support science and technology advances
3. Dedicating the results of mathematical research to society

4. Utilizing productive and sustainable collaboration with educational institutions, government and the business world at the regional, national and international levels that have been established by FMIPA and Andalas University

Objective:

1. Produce graduates who are competitive
2. Producing research outputs for international publications
3. Improving the implementation of mathematical research that is beneficial to society
4. Expanding the cooperation network to support the tri dharma activities of higher education

For the master study program *Mathematics* the institution has presented the following profile on the study programs' webpage (accessed 08.04.2024):

"Vision:

Become a competitive Masters in Mathematics Study Program in the field of theoretical and applied mathematics at international level by 2028.

Mission:

1. Organizing quality education, effective and efficient
2. Organizing basic and applied mathematics research activities to support the progress of science and technology with national and international standards
3. To dedicate research results in the field of mathematics in accordance with the needs of the community
4. Take advantage of productive and sustainable collaboration with educational institutions, government and the business world at the regional, national and international levels that have been established by FMIPA and Andalas University

Objectives:

1. Produce graduates who are competitive
2. Producing research outputs for international publications
3. Improving the implementation of mathematical research that benefits society
4. Expanding the cooperation network to support higher education tri dharma activities."

C Expert Report for the ASIIN Seal

1. The Degree Programme: Concept, Content & Implementation

Criterion 1.1 Objectives and Learning Outcomes of a Degree Programme (Intended Qualifications Profile)

Evidence:

- Self-assessment report
- Webpage UNAND https://www.unand.ac.id/
- Webpage Ba Mathematics http://matematika.fmipa.unand.ac.id/sarjana/
- Webpage Ma Mathematics http://matematika.fmipa.unand.ac.id/magister/
- Regulation of the Rector UNAND No 10 2022: Guidelines for curriculum preparation, evaluation and development
- Discussion during the audit

Preliminary assessment and analysis of the experts:

UNAND describes in its self-assessment report that each study program is developed aligning with the vision and mission of the university and the responsible faculty. The two study programs under review are associated with the Faculty of Mathematics and Natural Sciences, which aims to create globally competitive students until the year 2028. The Department of Mathematics and Data Science manages the bachelor and master program *Mathematics*. At UNAND, each study program is responsible to formulate educational objectives, which describe the desired qualification profile of the students at graduation. Based on UNAND's regulations, these shall cover aspects of attitude, knowledge, general skills and specific skills matching the requirements of the European Qualifications Framework (EQF) 6 and 7 as well as the Indonesian Qualification Framework (IQF, 6 and 8). The definition of the educational objectives considers internal and external stakeholders as well as recommendations from third parties such as the Indonesian Mathematical Society and market needs. UNAND summarizes the main sources of input for the development of the study programs in the following figure:

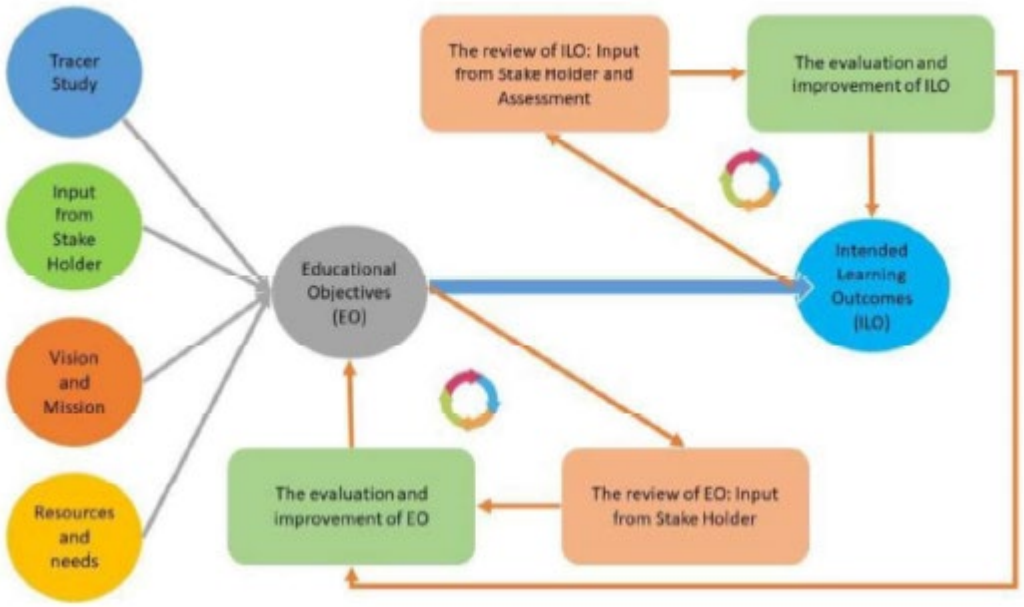

Figure 1. Design mechanism scheme of educational objectives and intended learning outcomes of the bachelor and master programs at UNAND (source: self-assessment report).

UNAND defines the following educational objectives (EOs) for the bachelor program *Mathematics* in its self-assessment report:

EO-1: Graduates are expected to be problem solvers and leaders in their work.

EO-2: Graduates are expected to do continuous learning and research, and to participate actively in the development of mathematics and the applications of mathematics.

EO-3: Graduates are expected to create jobs in society with their creativity and innovation

Based on these objectives, UNAND defined the following Intended Learning Outcomes for the bachelor program *Mathematics*:

ILO-1: Possesses good ethics and integrity.

ILO-2: Possesses profound knowledge of the basic concept of mathematics.

ILO-3: An ability to identify, explain and generalize simple mathematics.

ILO-4: An ability to use concepts and fundamental techniques of mathematics in solving simple mathematical problems.

ILO-5: An ability to formally and correctly prove simple mathematical statements using facts and methods that have been studied.

ILO-6: Have ability in data literacy and technology and can apply them in solving simple mathematical problems or other relevant fields.

ILO-7: An ability to communicate effectively especially in the area of mathematics with diverse communities.

ILO 8: An ability to work in a team.

ILO 9: An ability to apply knowledge of mathematics in a career and involve in life-long learning.

The experts acknowledge that these are identical with the presentation of the study program on the study program's webpage.

According to the tracer studies, UNAND defines the following typical occupations for graduates of the bachelor program Mathematics: (1) practitioners, (2) Educators or Researchers, and (3) Entrepreneurs.

UNAND describes in its self-assessment report that the qualification profile of the students is developed in collaborations with stakeholders and partners. In 2021, UNAND organized the last discussion group of alumni and graduate users to review the EOs and ILOs of the study program. This considered further the results of tracer studies and various satisfaction surveys. Based on the results of their tracer studies, UNAND confirm that 75% of all graduates are able to find employment within 12 months, which matches the qualifications reached in the study program.

According to the self-assessment report, UNAND has defined the following EOs for the master program *Mathematics*:

EO-1: Graduates are expected to be problem solvers, leaders, independent, and adaptive in their field of work.

EO-2: Graduates are expected to develop science and scientific techniques in solving problems in the field of work.

EO-3: Graduates are expected to develop a career through continuous learning.

Based on these EOs, UNAND has published the following ILOs:

ILO-1: Possesses good ethics and integrity.

ILO-2: Mastering mathematical concepts and applications (real analysis, advanced linear algebra, and statistics) in solving complex mathematical problems.

ILO-3: Comprehensive mastery of one or several theories for development in the fields of analysis, algebra, applied mathematics, statistics and combinatorial mathematics.

ILO-4: Mastering scientific techniques and developing them in solving research problems through multidisciplinary or interdisciplinary approaches.

ILO-5: Able to work and conduct research in the field of mathematics and related fields of science by developing the latest issues independently or collaboratively and communicating them academically.

ILO-6: Able to be actively involved in lifelong learning and sustainability.

Since the master program ***Mathematics*** was opened at UNAND, two major revisions took place in the years 2015 and 2018 to implement and adapt to the developments in science and technology. According to the tracer studies, UNAND states that the majority of the graduates works closely related to education and government in jobs matching their qualifications. This includes mainly practitioners, researchers and academics. In 2023, the program coordinators organized a meeting to collect input and suggestions on the graduate profile of the master program ***Mathematics***, which will be considered in the next major revision of the study program.

In the discussion with the representatives of the rector's office, the experts request more information on the connections of UNAND to the industry. They emphasize that UNAND's strategy plan includes connecting each study program with the industry. Collaboration takes place on various levels. While the university cooperates with partners for research, education and consultation, on the level of the study program, UNAND has collaborations regarding the internships (MBKM program; see criterion 1.3). Furthermore, the program coordinators mention that each study program has its own advisory board to continuously give external feedback to the development of the study programs. The industry representatives confirm their collaboration in research and education, which are supported by Memorandums of Understanding. As partners from the bachelor and master study program Mathematics, they mention partners from banks, governmental agencies, schools and diverse industry sectors (mainly of statistics and data analysis). Thus, the industry represenatives confirm to the experts that the content of the study programs and the learning materials are prepared considering the needs to the labor market. Various industry representatives describe how they were previously involved in the development of the curriculum and study programs. Furthermore, the industry representatives were previously invited to events, such as a job fair, where almost 50 factories could present themselves to

the students of Mathematics. According to the majority of industry representatives in discussion, their collaboration with UNAND is based on Memorandums of Understanding managing responsibilities in teaching and research collaboration.

In the discussion with the students, the experts learn that the majority choose to study at UNAND due to its high reputation as (one of the) best universities on Sumatra island. Others were motivated by UNAND's promotions such as reaching students in schools (e.g., by organizing Olympiad in mathematics). They are content with their decision and emphasize that UNAND offers them the high quality education they expected. In addition, the alumni state to the experts that they appreciate that they have learn relevant soft skills as well as competences in morals and ethics.

In conclusion, the experts acknowledge that the objectives and learning outcomes (the intended competence profile) of the bachelor and master program Mathematics are defined by UNAND. They are transparently anchored and published and thus are available to students, lecturers and interested third parties. In the opinion of the experts, the objectives and learning outcomes reflect the targeted academic qualification level of EQR 6 and EQF 7, respectively. They consider the objectives and learning outcomes are feasible and equivalent to the relevant exemplary learning outcomes specified in the applicable ASIIN SSCs. Moreover, the experts see evidence that UNAND prepared the objectives and learning outcomes reflecting the labor market and society by involving relevant stakeholders (in particular from higher education and professional practice). Regular reviews take place and, if necessary, the objectives are revised accordingly. Although the experts acknowledge the study programs' connections to industry partners, the experts recommend to continue to expand their collaborations with companies and agencies. This should include collaboration in reaching as well as in research.

Criterion 1.2 Name of the Degree Programme

Evidence:

- Self-assessment report
- Diploma Supplement
- Decree of Minister of Research, Technology, and Higher Education No. 59/Dikti/Kep/1996
- Decree of Minister of Research, Technology, and Higher Education No. 4672/D/T/2008
- Webpage UNAND https://www.unand.ac.id/

- Webpage Ba Mathematics http://matematika.fmipa.unand.ac.id/sarjana/
- Webpage Ma Mathematics http://matematika.fmipa.unand.ac.id/magister/

Preliminary assessment and analysis of the experts:
In its self-assessment report, UNAND describes that graduates of the bachelor program Mathematics receive a degree as a Bachelor of Science. Likewise, the master program Mathematics awards graduates a degree in Master of Science. The name is in accordance with the national regulations and the international community.

The experts confirm that the titles of the study programs reflect the intended objectives and learning outcomes as well as the teaching and learning content. Based on the submitted documentation and the online presentation of the study programs, the experts observe that the study program names were consistently used in the teaching language of the programs as well as in English.

Criterion 1.3 Curriculum

Evidence:

- Self-assessment report
- Bachelor structure curriculum document
- Master structure curriculum document
- Module handbook of each study program
- Webpage UNAND https://www.unand.ac.id/
- Webpage Ba Mathematics http://matematika.fmipa.unand.ac.id/sarjana/
- Webpage Ma Mathematics http://matematika.fmipa.unand.ac.id/magister/
- Regulation of the Rector UNAND No 10 2022: Guidelines for curriculum preparation, evaluation and development
- Discussion during the audit

Preliminary assessment and analysis of the experts:
Content and structure of the programs

After studying the submitted documents, the experts acknowledge that the bachelor program *Mathematics* requires at least 217.4 European Credit Transfer and Accumulation System (ECTS) credits (or 144 credit points/CPs) at graduation. The intended study duration of eight semester or four academic years. The curriculum distinguishes between 151 ECTS (100 Indonesian CPs) credits of compulsory courses and 66.4 ECTS credits of elective

courses (44 Indonesian CPs). The first and second semester contains compulsory courses only. Starting from the third semester, students can choose elective courses according to their interest in addition to their mandatory courses whereas the sixth and seventh semester only considers electives. The program offers 36.2 ECTS credits of electives related to the study program's major five areas of specialization ("research group") as well as 30.2 ECTS credits outside of this scope. The experts learn that the fields consists of (1) Algebra, (2) Analysis and Geometry, (3) Combinatorics, (4) Applied Mathematics, and (5) Probability Theory and Statistics. After selecting one of the five groups, the students have to take six courses in this area of specialization followed by their bachelor thesis in their area of interest. The work of the students is divided into final project 1 (seventh semester) and final project 2 (eighth semester). The compulsory curriculum further contains the "Student Community Service" (4 CPs or 6 ECTS credits). In this module, students spend time outside the campus joining community service projects with collaboration partners in local and provincial governments. Opportunities to join a community service project are organized and offered by UNAND.

UNAND has adapted the curriculum of the bachelor program Mathematics for the national MBKM program (Independent Learning-Independent Campus or Merdeka Belajar-Kampus Merdeka program). At UNAND, the MBKM program can be used to take part in off-campus learning for at least one semester with a workload of 20 CPs. The students describe to the experts that they have taken various MBKM activities including for example international student exchange (one semester), research internships and courses outside their university.

According to the self-assessment report, the master program ***Mathematics*** is build up by 60.4 ECTS credits or 40 CPs. This considers 42.3 ECTS credits of compulsory courses and 18.1 ECTS of electives. The study program is designed to be completed in four semester or two academic years. The master program ***Mathematics*** follows the same area of studies as the bachelor program; students need to choose either (1) Algebra, (2) Analysis and Geometry, (3) Combinatorics, (4) Applied Mathematics, or (5) Probability Theory and Statistics. At the beginning of their studies, students have to select their specializations to receive training in their preferred field next to a set of compulsory course.

The experts discuss the structure of the bachelor program during the on-site visit. The presented curricular overview focuses only on seven semester, although it is an eight-semester bachelor program. The program coordinators explain that the students start to work on their final project in the seventh semester; therefore, a minority of students are able to complete their studies within seven semesters. Students with a Grade Point Average of higher than 3.25 are allowed to take up to 24 CP each semester whereas the average students takes only up to 21 CPs. To finish early, students need to have a high Grade Point

Average through their studies and take the maximum number of courses, which qualifies them to graduate in seven semesters. However, the majority of students still completes their courses in the seventh semester before focusing on their final thesis in the eighth semester. The students confirm that exceptional students can graduate within seven semesters; however, this is not the case of most students. They describe that an early graduation requires a high dedication to their studies and not taking part in any internship (or the MBKM) program. The lecturers explain that their curriculum reserves the last semester of the bachelor and master program for working on their thesis. However, master students commonly start their thesis in the third semester, where they still attend lectures. In comparison, bachelor students spend around 40% of their eighth semester on the bachelor thesis while they still complete courses in the seventh and eighth semester. Nevertheless, the lecturers confirm that bachelor students might start in the seventh semester with their bachelor thesis and complete their studies in seven semesters. In their opinion, these students are exceptions. Although the experts acknowledge the shorter study duration of gifted students, they highlight that UNAND needs to provide a curricular overview, including a reasonable number of modules for each semester, which an average student can follow. This overview needs to correctly represent the workload of each semester with an adequate workload for the students expressed in the number of credits points. Moreover, the workload of the final thesis needs to be expressed.

Similarly, in UNAND's submitted documentation, the curricular overview of the master program does not include a 4^{th} semester. The program coordinators insists that also the master program is typically completed within four semesters while only gifted students manage to graduate in the third semester. They estimate that only one student per cohort finishes their studies in three semesters in the master program (out of eight students on average). The program coordinators add that UNAND enables students also to finish their master program using a "fast track" system. The "fast track" systems allows the students to take courses from the master program while still working on the bachelor thesis. Nevertheless, the experts emphasize that the curricular overview of the master programs has to reflect the situation of the average students and should therefore list courses divided to four semesters for a four-semester program.

In their discussion with the experts, the program coordinator further confirm that elective courses in the master program are open if only one students is interested in them. They are aware that the student numbers in the master program is small; nevertheless, they want to support the students in developing in the direction of their interest. The students confirm this. The students of the master program add that usually there are between three and five students in one elective course. However, they are aware that there is e.g. only one students in the research group focusing on algebra, who can still take their courses.

The experts appreciate that all master students can choose the elective courses based on their interests. According to the students, the majority of students choses the specialization on “Probability Theory and Statistics” because they expect better job opportunities in this field. The students of the bachelor program add that usually they choose their elective courses according to one of the five research groups starting in the third semester of the bachelor program.

The experts raise several questions on the content and order of the courses of the bachelor program. This includes for example, the obligatory courses in natural science in the early semesters or differences in “Calculus” and “Real Analysis.” The experts further aim to understand which courses are related and which are prerequisites for others. In the opinion of the experts, the program coordinator should give then a sufficient insight into their motivation of their course structure. In addition, they could also address the experts’ concern concerning module content and qualifications. Students state to the experts that they never felt they missed competences when starting a course. Therefore, they consider the order to courses well considered, which the experts acknowledge.

The program coordinators explain that several courses include the learning outcome of the ability to communicate effectively because they include collaborative group work and discussions. This allows the students to talk about complex scientific topics and additionally they learn to explain mathematical theorems. The program coordinators acknowledge that courses might have similar titles in the bachelor and master program; however, the content matches the level of the program accordingly. They mention that for example “Real Analysis” in the bachelor program focuses on Dimension 1, while the course in the master program includes Dimension 2 and 3. The experts emphasize that these differences need to be reflected in the module descriptions in the module handbook. Likewise, the experts notice that courses in the module handbook are labeled as electives, although they are compulsory in reality (e.g. “Statistics” and “Numerical Methods”).

The experts further questions, which software is integrated in their compulsory courses. The program coordinators mention that they mainly use MATLAB, Python, and R. While the later two are open source software, they do have sufficient licenses for MATLAB. The experts note that module descriptions in some module further mention “Turbo Pascal”, which they consider to be quite outdated. The university explains that this is more for a demonstration whereas they actually use C++ in these lectures. The program coordinators add that in several lectures, practitioners (people from the industry) are involved, which also ensures that the content of the lectures is up to date with the market needs. As one example of joint lectures, the program coordinators name the course on “Entrepreneurship.” In the discussion with the industry partners, they mention to the experts that they are often invited in teaching lectures. In turn, they also invite the lectures from the university to give

courses in their companies. The students confirm to the experts that they receive sufficient introduction to the integrated software in their lectures. They often learn additional software, such as LaTeX, based on courses offered by the student associations, assistance offered by the lab technicians and individual practice. The students specify that they only learn the basics of "Turbo Pascal" in one lesson introduction, but never apply it in any course. Although the experts acknowledge the historical significance of programing languages such as "Turbo Pascal" but emphasize that it should not be part of a modern curriculum. Although the industry representatives show a high satisfaction of the students' skills in data analysis, they add that certain applied methods and software might be outdated in their option. They suggest especially focusing on topics such as machine learning and artificial intelligence. After studying the module handbooks and syllabi, the experts find that "Turbo Pascal" is often cited in the applied methods and learning outcomes. The experts might assume that these describes were not updated for some time and urge the university to provide new descriptions focusing on the methods used in the current lectures. The experts therefore request new module descriptions, which show adequately, which methods are integrated in the modules including references to the applied software (see criterion 4.1).

The experts also questions students if anyone took part in internships. The students report that several took internships, which most characterized as research internship at agencies such as the "National Research and Innovation Agency." They describe that the curriculum allows only taking one month during semester breaks; however, many companies and institutions require the students to spend two months. Therefore, students often take their internship during the vacation period. In contrast, the students mention that the community service is already incorporated in their study plan and fully organized by UNAND. The industry representatives confirm that they receive students. They support the impression of the students that an internship of one month is often not sufficient; from their perspectives, a duration of at least three months would be more efficient to give the students a deeper insight and experience. They state that one month does not allow the students to collect and analyze data, which is the main task of the internships in their companies. During the internship, the company appoints a responsible person to supervise the student(s). In addition, regular contact with the supervisors at UNAND is maintained. The teaching staff confirms to the experts that students choose the MBKM for taking internships since UNAND currently does not offer a formal (elective) course for internships. It acknowledges that internships are not part of the master program; therefore, students only have chances to take part in internships in the bachelor program within the curriculum. However, the lecturers emphasize that students can choose to take up to 20 CPs of MBKM, equal to one semester. Consequently, students could theoretically work in a one-semester internship at

a company and fully transfer their activities to credit points. However, they admit that not many students take part in internships at the moment. The lecturers confirm that the students have one industry advisor, who meets with them daily during this period. The students add that they have to write a report at the end of their internship presenting their tasks, results, and conclusion. The grading of the internship considers the recommendations of the company as well as the quality of the report. Although the industry advisors are not directly involved in the grading, their opinion is considered. In the opinion of the experts, the number of internships in the bachelor and master program should be increased. They advise that UNAND should promote and support the students in taking internships. This might include offering them several partner companies/institutions who regularly receive students. In addition, the university should transparently explain to the students the benefits of a three to six month internship, which can fully be credited within the MBKM program.

The industry representatives discuss their involvement in teaching with the expert. One highlights that their company collects problems and/or data, e.g. from production, and forwards them to the university as “real-world problems” to solve in their lectures. They state that their company generates a high amount of data but does not employ enough people for the analysis. Therefore, the collaboration between their company and UNAND benefits both sides. After solving problems, students were invited to the company to discuss their results and possible solutions. In addition, several students also spend internships at the company doing data analysis. Although the industry representatives are generally very satisfied with the competences of the students, they emphasize to include modern methods such as machine learning and artificial intelligence in the curriculum.

The representatives of the rector’s office ensure that UNAND is concerned about the well-being of the students. In order to ensure sufficient support, each students receives an academic advisor, who acts as the first contact. The university further offers offices to advise students with psychological and mental health issues. UNAND operates a Center of students with disabilities. UNAND is currently also increasing the funding resources to offer a higher number of scholarships. In addition, it offers dormitories and a career center as well as training and workshops to support the character development.

The experts acknowledge that the bachelor and the master program are build up by modules; each module represents a well-matched unit of teaching and learning. Based on the submitted documentation, the experts approve that the structure of the curriculum allows the students to acquire knowledge, skills and competences in each module in a well-considered order. The experts see evidences that students can complete the studies in eight and four semesters, respectively. In addition, students can choose electives to gain knowledge in their field of interest. Nevertheless, the experts highlight that the presented

documentation does not give a clear picture of the structure of the study programs. The experts remind UNAND that the presented study plan needs to give a clear overview of the courses, which the average students should take in each semester.

The experts summarize that UNAND has established curricula in the bachelor and master program *Mathematics*, which support the students to achieve the intended learning outcomes. The experts acknowledge that learning outcomes are defined for each module, which, in total, enable the achievement of the overarching program objectives. The experts appreciate that students in the bachelor program have the opportunity to take part in internships, but highlight that UNAND should provide a transparent overview of the possibilities to convert the off-campus activity into credits (especially for three to six month internships). In addition, the students should be motivated to take part in internships. Nevertheless, the experts approve that UNAND allows the students to take part in well organized and supervised internships. However, the experts point out that UNAND could work on a greater variety of internships in the different fields of mathematics. This should involve a higher number of collaborations partners from different fields of industries. In addition, the experts recommend to restructure the master program *Mathematics*. Although they approve that the current five specializations offered by UNAND match the fields of research by the staff members, the experts consider to divide the students only in three groups. This groups should follow the internationally standard divisions in the field of (1) pure mathematics, (2) applied mathematics and (2) statistics. In the opinion of the experts, an attempt to restructure the program specialization to internationally recognized terminology would further allow the students of pure mathematics to form larger groups.

Student mobility

UNAND describes in its documents that it offers different opportunities to join student exchange programs. During the on-site visit, the representatives of the rector's office explain that UNAND offers organizational support via its international office, who manages the requests and distributes general information. Additionally, UNAND provides financial support/scholarships covering allowances and travel costs. This also includes a specific budget for student mobility regarding community service. Additional funding is available from partners, such as collaborating companies and organizations. The international office further supports students to apply for governmental funding, which allows the students to stay outside Indonesia for six months. For governmental and institutional scholarships, the students need to fulfill certain criteria including a high academic score and TOEFL test scores.

The program coordinators state that currently no international students are enrolled in the bachelor or master program *Mathematics*. They admit, that it might be challenging since

all courses are taught in Bahasa Indonesia. In case someone wants to join, they are willing to update their reading materials and teach courses of interest also in English (if feasible).

Based on the presented data, the experts acknowledge that outgoing students often go to Malaysia and Japan. For bachelor students, UNAND offers the Sakura Science Program to go to Japan and cooperations with the Universit Teknologi Malaysia for regular student exchange (one semester). In addition, the SEAMS Schools gives bachelor and master students the opportunity to work at schools in Hanoi (Vietnam). Students and alumni confirm access to these programs. While some students mentioned they went to stay abroad for one month (e.g. to Japan), other report that they spend one semester outside UNAND (e.g., in Malaysia). None of the students has experienced any problems with transferring externally achieved credits or converting activities outside the curriculum to credit points. Moreover, students mention that they are applying for a governmental scholarship called Indonesian International Student Mobility Awards (IISMA). In all cases, the students positively highlight their lecturers' support in preparing applications to spend time outside UNAND.

The industry representatives also support a higher student mobility, especially on an international level. They highlight that the students benefit from the experience in different cultures and likewise different working methods. Moreover, they consider that the students would increase their English skills abroad, which will further have a positive impact on their career.

The experts support UNAND's effort to create opportunities for students to spend time at different universities. UNAND provides an appropriate framework for (structural design of the degree program, recognition of qualifications and support services) and acknowledges externally awarded credits points. According to the experience of the experts, the number of outgoing and incoming students at UNAND in the study programs *Mathematics* is still low. The experts encourage UNAND to establish a higher number of student exchange programs with foreign universities to allow them to gain experience abroad and provide information to students.

Periodic Review of the Curriculum

UNAND describes in the self-assessment report that the curriculum of the bachelor and master program *Mathematics* integrates periodic changes in accordance with the developments in science and technology. These changes integrated internal aspects (due to the vision, mission, goals of the university, and input from inside stakeholders) and external aspects (such as work demand, job opportunities, and outside stakeholders).

In its last curriculum revision in 2021, UNAND formed a curriculum discussion group with stakeholders including alumni and users (employers), and partners coming e.g. from government agencies, private companies, and educational institutions. Each revised curriculum requires approval from the Academic Senate and the President of UNAND before it can be initiated. Once the revised curriculum becomes active, students and staff receive explanations on all changes in the content and/or structure of the curriculum. Based on the comments of the representatives of the rector's office, the most recent curriculum review included an update of many study materials, which were considered outdated by the industry partners. Students provided similar feedback. As a result, updates in the curriculum were made revising the course material by adding more content on programming languages and data processing applications needed in the workplace. UNAND further states that it included mathematical modeling as a compulsory course, where students learn to work with real world data. Moreover, students are introduced how to perform quality control in industry processes in the track "Statistics."

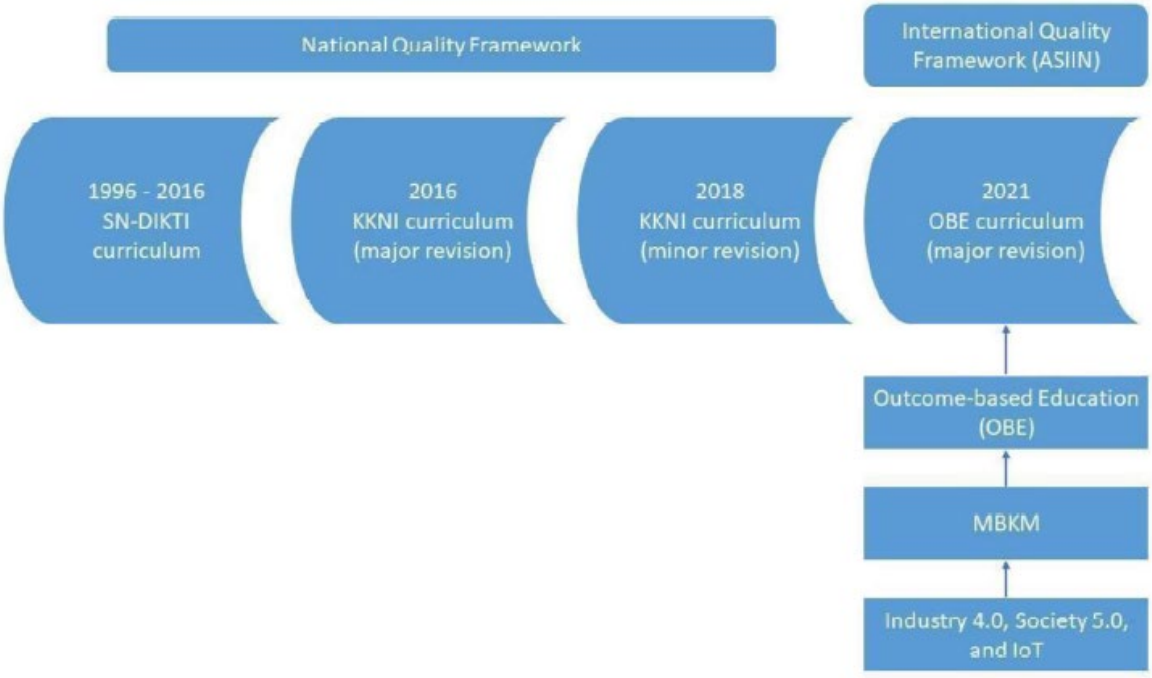

Figure 2. Major changes and influences in the development of the curriculum of the bachelor program Mathematics*.Note: SN-DIKTI: National Higher Education Standards; KKNI: Indonesian Qualification Framework; MBKM: Merdeka Belajar – Kampus Merdeka (Independent Learning – Independent Campus) (source: self-assessment report).*

The teaching staff describes to the experts that major curriculum revision takes place every five years. Minor revision can occur every 2 to 3 years, considering the developments in the field as well as feedback by internal and external stakeholders.

The industry representatives support this statement; they explain that they were invited to the curriculum review workshops in the past, where they could openly give their feedback. This included an initial digital survey as well as digital meeting afterwards to discuss the results. Their suggestions were, for example, to teach basics business and entrepreneurship. They point out that they did not receive a feedback from UNAND on the implementation of the workshop; however, due to their continued collaboration, they learned that many suggestions were integrated.

The experts confirm that the curricula of both study programs are periodically reviewed with regard to the implementation of the program objectives; curricular changes are documented.

Criterion 1.4 Admission Requirements

Evidence:

- Self-assessment report
- Webpage UNAND https://www.unand.ac.id/
- Webpage Registration Ba *Mathematics* http://matematika.fmipa.unand.ac.id/sarjana/pendaftaran/
- Webpage Registration Ma *Mathematics http://matematika.fmipa.unand.ac.id/magister/pendaftaran/*
- Regulations for the admission of bachelor students
- Regulations for the admission of master students
- Discussion during the audit

Preliminary assessment and analysis of the experts:
According to the self-assessment report, UNAND accepts bachelor students in the program Mathematics based on the following schemes: (1) National selection based on achievement (students with outstanding academic or non-academic achievements), (2) National selection based on tests (computer-based written test organized by the government of Indonesia), and (3) Admission selection based on a university test. In the self assessment report, UNAND states that of all students, 20% are accepted based on (1), 30% are accepted based on (2) while 50% of all students are accepted due to (3). On the webpage, UNAND presents the number of applications in comparison with the number of accepted students. In discussion, the program coordinators confirm that the number of applicants is still significantly higher than the number of accepted students (still around 100 in the year 2024).

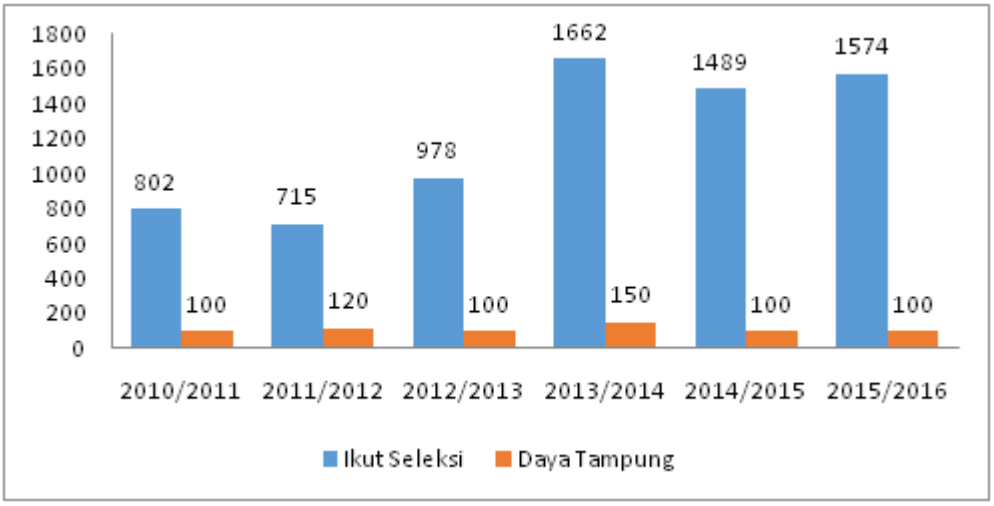

Figure 3. Comparison of applied ("Ikut Seleksi", blue) and accepted "Daya Tampung"; orange) students between the years 2010 and 2016 (source: http://matematika.fmipa.unand.ac.id/sarjana/pendaftaran/; accessed 09.04.2024).

The representatives of the rector's office describe that several types of scholarships are available to support the students. Among the most common are private scholarships from their collaborations (e.g. industry) and governmental scholarships. The representatives of the rector's office mention that one out of three students receives some kind of scholarships.

According to the submitted documentation, the admission to the master program *Mathematics* require the diploma and transcript of records of a bachelor degree in Mathematics as well as a filled out registration from. In addition, the students need to provide at least to letters of recommendation and a GPA higher than 2.75. The program coordinators acknowledge that the number of master students is still low; therefore, currently they experience no limitations due to capacity.

The experts summarize that UNAND has established admission requirements and procedures, which are binding and transparent. Rules for the recognition of qualifications achieved externally (e.g. at other higher education institutions or outside the higher education sector) are clearly defined.

Criterion 1.5 Workload and Credits

Evidence:

- Self-assessment report
- Bachelor structure curriculum document
- Master structure curriculum document

- Module handbook of each study program
- Results of the students‘ workload evaluation
- Discussion during the audit

Preliminary assessment and analysis of the experts:
UNAND describes in its self-assessment report that the students’ workload is based on the Indonesian Credit Point System (CPs or sks in Bahasa Indonesia). The curricula of the bachelor and master study program are based on modules, where students receive credit points after completion. The credit load considers the time students spend on completing the course considering in-class learning hours and self-study hours. UNAND monitors the workload of the students by distributing student surveys on the credit load. UNAND documents that it considers these surveys to adjust the credit points of each module. To complete the bachelor program, the students need to collect at least 144 CPs whereas the graduation of the master program requires at least 41 CPs.

UNAND presents for the bachelor and master program the following conditions to convert it to ECTS. They consider that one ECTS credit point is equal to a workload of 30 hours. One CP represents 170 minutes or 2.83 hours (50 minutes in class, 120 minutes self study) for 16 weeks in one semester. Therefore, one CP converts to 1.51 ECTS credits.

During the discussion with the representatives of the rector’s office, the experts request further information how UNAND monitors the staff and students’ workload. The experts learn that UNAND analyzes the student workload in order to revise the distribution of credit points of the curriculum. The student workload is defined following national standards (Indonesian Qualification Framework). The program coordinators specify that students are asked in the end-semester course evaluation about their actual workload. In addition, students were involved during the last curriculum review, where UNAND matched curriculum to an outcome-based education.

According to the students, the workload in both study programs is adequate to peruse private interests and spend time with family and friends. In addition, they consider the workload evenly distributed among the semesters and within the semester. They describe to the experts that some students are able to take additional courses outside the curriculum based on the interest without any troubles. Based on the estimate of the majority of students, they spend around 40 hours per week on their studies, including lectures, assignment and self-study. Although, they highlight that this does not mean that their study program is too easy. Moreover, the students have sufficient time to prepare for their courses as well as their examinations.

Although the experts acknowledge the conversion from CPs to ECTS credits in the bachelor program, they consider the conversion rate in the bachelor program unclear. According to the presented conversion rate of 1:1.51, the 40 CPs from the master program convert to 60.4 ECTS credits. In comparison, a four semester master program in Europe would equal a workload of 120 ECTS credit points. Since the program coordinators insist that the master program Mathematics represents also a four semester master program, the experts wonder if the workload is adequate. According to their opinion, either the presented workload is very low in comparison to the European standards or the conversion rate of CPs to ECTS credits should be different in the master program. Based on the discussion during the on-site visit, the experts presume, the problem might be conversion rate since both students and teaching staff describe a workload around 40 hours per week. The experts emphasize that UNAND needs to address this issue and present a conversion presenting an adequate workload in ECTS credits for the master program *Mathematics*.

In addition, the experts state that the workload of the bachelor and master thesis remains unclear. The different discussions rounds described various durations for both theses; however, UNAND did not show any evidences how the duration of the work in the regard to the thesis is monitored. According to the curriculum, the bachelor program considers eight CPs for the bachelor thesis, consisting of “Final Project 1” (4 CPs, “Seminar” (1 CP), and “Final Project 2” (3 CPs). This would equal a workload of 12.08 ECTS credit points. According to European standards, this is the workload of a half a semester, although UNAND considers an entire semester for the bachelor thesis. Likewise, the master thesis has a total workload of 10 CPs considering the modules “Research Proposal” (2 CPs), “Seminar” (2 CPs), “Thesis 1” (3 CPs), and “Thesis 2” (3 CPs), distributed among the second and third semester. According to the presented calculation, this represents a workload of 15.1 ECTS credits, and therefore also the work of half a semester. However, the students state that they usually for an entire semester on the master thesis. The experts highlight, that UNAND needs to improve the presentation of the workload of the bachelor and master thesis and start to adequately monitor how much time students spend on their thesis (including research). Furthermore, also the conversion of the total workload of the master thesis needs to be questioned.

The experts conclude that UNAND has implemented a credit system based on the student workload. The workload includes contact hours and self-study time. UNAND awards credit points for all compulsory components of the bachelor and master program *Mathematics*, which are based on the workload of each module. The experts consider the estimated workload for the bachelor program realistic and well-founded, which allows the average

students to complete their studies with the standard period of studies. However, the experts identify the need to update the conversion of ECTS credit points in the master program (see also criterion 2).

Although UNAND monitors whether the credits awarded for each module correspond to the actual student workload, the experts miss evidences for similar monitoring for the bachelor and master thesis.

Criterion 1.6 Didactic and Teaching Methodology

Evidence:

- Self-assessment report
- Module handbook of each study program
- Discussion during the audit

Preliminary assessment and analysis of the experts:
UNAND describes in its self-assessment report that the teaching and learning methods in each module are decided considering the ILOs of this course. The characteristics of the learning process shall be designed to be interactive, holistic, integrative, scientific, contextual, thematic, effective, collaborative, and student-centered. Likewise, the bachelor and master programs are student-centered and cover various teaching methods. These learning methods include group discussions, simulations, case studies, collaborative learning, cooperative learning, project-based learning, case-based methods, Research Based Learning (focus for master program only).

The teaching staff describes their usually integrated teaching methods to the experts. The lecturers state that they motivate the students to active and collaborate learning. They often give assignments or tasks to students where they work together in the classroom or outside. According to UNAND's regulations, the teaching staff should integrated project-based learning as well as case-based learning when applicable. The lecturers acknowledge that modern skills in Mathematics also require programming competences. In the two programs under review, they focus on teaching MATLAB and Python as well as R. In some courses, they further integrate Mathematica. In order to learn coding, the lecturers present on case projecting the code to everyone to copy. In more advanced lectures, the students then have to solve problems by themselves or in a group. In these lectures, they often integrate real data for the students to practice.

The experts notice that the documentation further mentions "Research-based Learning." According to the teaching staff, this teaching method is mainly applied in elective courses.

As one example, they mention “Topics in Combinatorics” where students first learn basics in the topic because they receive a topic with new developments in this field. The students are required to search for recently published research articles and write a draft article themselves. The lecturers specify that research-based learning is only applied in small courses to supervise the students in their individual work. In comparison, case-based learning can be individual or in a group. In their experience, case-based learning involved problems that can be easily solved (often in class). In contrast, project-based learning is mainly used for group work. At the end, the students have to develop a model or a prototype. For this learning method, the students only receive an explanation in the first class whereas the students have to active work on this project in the following courses.

In summary, the experts confirm that in the two study programs under review, a variety of teaching methods and didactic means are used to promote achieving the learning outcomes. In the option of the experts, the both study programs contain an adequate balance of contact hours and self-study time. In addition, students are introduced to independent scientific work. The experts further see evidence that the teaching methods are regularly reviewed.

Although the experts approve the teaching methods in the bachelor and master program *Mathematics* and the descriptions during the on-site visit, the submitted documentation requires some improvement. This refers especially to Table 1.11 (ILO, Learning Methods, and Assessment Methods Matrix BM Courses; page 38) and 1.12 (ILO, Learning Methods, and Assessment Methods Matrix of MM Courses; page 39) in the self-assessment report. The experts suggest that UNAND should individually consider the ILO and improve the learning methods and assessment methods involved.

Final assessment of the experts after the comment of the Higher Education Institution regarding criterion 1:

ad criterion 1.1.

UNAND describe in its statement that it increased in the cooperations and collaboration with several national partners recently. As evidence, it provides several Memorandum of Understanding and tables about student mobility. The experts acknowledge these new documents but highlight that most of the newly presented collaborations are with universities and research institutes. Although these will strongly benefit students with an interest of scientific applications, the experts remark they recommend UNAND increasing their collaboration with (local) industry. They continue to issue the recommendation E1.

Ad criterion 1.3.

The experts approve the presented updates for the study plans, which now clearly represent eight semester for the bachelor program and four semester for the master program.

The experts further appreciate the additional explanations towards the curriculum. They especially highlight new courses regarding data science, computational statistics and artificial intelligence as well as deleting Turbo Pascal from their curriculum in favor of Python and C++.

The experts consider the rising numbers of students taking part in the MBKM program as positive. However, the experts continue to issue the recommendation E5 to encourage students to take part in long-term internships (three to six months) in industry or research. In addition, the experts emphasize on the importance of international student mobility to students regarding their professional development. Therefore, they decide on the recommendation E2.

Ad criterion 1.5.

UNAND did not submit any new evidences to document how it monitors the workload of the students during their bachelor and master thesis. The experts continue to issue A1 suggesting UNAND to ensure that the students' workload does not exceed the number of awarded credit points.

Furthermore, the conversion of Indonesian credit points to ECTS credit points remains inconclusive to the experts. UNAND has submitted the same documents at during the on-site visit, which did not allow clarifying the real workload of the students during the master program in ECTS credit points. The experts decide on the requirement A5 to address this issue.

Ad criterion 1.6.

The experts acknowledge that the presentation of the course learning outcomes is part of the module handbook. However, the experts emphasize that their comments about the intended learning outcomes, methods and assessment methods refers to the matrices presented in Table 1.11 and 1.12 in the self-assessment report in regard to the study programs. These tables intent to present the learning and assessment methods implemented to reach the intended learning outcomes of the study program. The experts' decision on A2 remains unchanged.

2. Exams: System, Concept and Organisation

Criterion 2 Exams: System, Concept and Organisation

Evidence:

- Self-assessment report
- Module handbook of each study program
- Examples of exams during the on-site visit
- Examples of bachelor thesis
- Examples of master thesis
- Discussion during the audit

Preliminary assessment and analysis of the experts:
UNAND describes in its self-assessment report that the learning outcomes of each module define the assessment methods. Most modules integrate a variety of assessment methods, which consider an assessment weight in percentage. UNAND describe the assessment methods for the bachelor and master program Mathematics mainly as follows in its self-assessment method: “Learning assessment is carried out to fulfill the learning outcomes of each course. Assessment of attitude and general skill achievements is carried out throughout the learning process using assessment rubrics. Assessment of knowledge mastery is performed through quizzes, assignments, mid-semester exams, and final exams. Assessment of specific skills is conducted by evaluating students' computational abilities facilitated by laboratory facilities (teaching assistants, practical models, laboratory practice standard operating procedures, and program/software applications such as Maple, MATLAB, Python, Minitab, SPSS, and R-Studio).”

The experts identify that students need to complete different kinds of assessments throughout the semesters including exams, quizzes, self-assignment and group assignments. The program coordinators describe to the experts that the course syllabus they use gives information to the students on the assessment methods of each course and time when the assessment will take place. In addition, each lecturer will explain the students during the first class, which assessment methods are integrated in this module. The experts question how UNAND ensures that students have enough time to prepare for their exams. The program coordinators clarify that there are two major examinations during the semester, the mid-term exam (week 8 of the semester) and final exam (week 16 of the semester). In addition, they engage the students in different kind of assessments to be able to give them feedback on their learning process. In each course, a different set of assessment methods are applied, which are all considered in the final grade based on a percentage

scale. One of them are group assessment in project-based learning activities, where they apply a soft skill rubric to evaluate also more than the technical knowledge. Quizzes usually are selected as one examination method to test the knowledge of a specific subject. The students describe to the experts that they are usually taking six courses per semester, which results in three exams each of the two-week examination period. On average, one examination is around 120 minutes and takes place in written form. The students appreciate that the last week before their mid-term and final examinations has no classes allowing them to prepare for their examination.

The experts further question the students on their opinion and usefulness of "quizzes" and other assessment methods. In the opinion of the students, assessment during the semester such as quizzes help them to prepare for their exams since they encourage them to continuous learning. In addition, they appreciate the feedback. The students explain that quizzes focus only one topic while exam cover half of the entire course. The students admit that the majority of their assessments are in written form; however, oral exams also occur in the bachelor and master program *Mathematics*. Oral exams are usually done in groups of up to five students and take around 15 to 20 minutes. The students confirm to the experts that they are aware how their final grade in each module is calculated based on the information they receive in class and in their syllabus. The teaching staff adds that each module does have four assessment methods or less. In most cases, these include the mid-term and final exam as well as one quiz and one presentation. Since they teach in a team, they discuss the different assessment methods with each other. The lecturers add that the exams differ in the master program *Mathematics*. In the master courses, students are more often responsible to solve case-based problems and give presentations. This means, in many cases one written exam is replaced by a case-based assignment, which results in either a report or a presentation in class.

Upon the question by the experts, the teaching staff explains the validation of the exam questions. Once the team agrees on questions for the written examinations, they share them with the Quality Assurance Unit on department level. The members of the Quality Assurance Unit are lectures at the Department on Mathematics, thus they are qualified to review and validate the exam questions of their colleagues. The review focuses on an adequate level of the questions as well as if the questions match the content and learning outcomes stated in the module handbook.

The experts notice in the documentation that students are able to improve their grades. The program coordinators clarify that there are regulations for make-up exams in case students fail their exam. Students are allowed to retake the exam three times; afterwards the students have to retake the course. According to UNAND's regulations, the students can register for a course as often as they want (i.e. until they are able to complete the course).

In addition, there is the possibility to improve grades by retaking exams. In this case, the grade of the last try will be taken into consideration for the final grade, no matter if the student could reach a higher grade or not. The students assure the experts that they are aware of the regulations to repeat examinations and courses. They mention that remedial examinations are only for students with poor score in the course (D or E) because UNAND requires that all courses need to be passed with at least the grade C (final grade of the course). According to them, they can access remedial examination dates in their online system, which they consider as easily accessible. They highlight that repeating courses is tied to the semesters; i.e. if they fail a course in an odd semester, they can only repeat it in an odd semester. The experts approve the opportunities for students to retake their exams and courses.

Furthermore, the students confirm that they are familiar with the regulations to question and appeal the results of exams. In practice, the all lecturers will return their examinations to allow them to ask questions. If they address an issue directly, the lecturer explains the students' error, which commonly resolves the problem. If the issues remain, the students are aware how to submit an appeal to initiate in investigation. The students confirm to the experts, however, that they have never witnessed anyone submitting an appeal.

During the discussion with the program coordinators, the experts mention also the total workload of bachelor and master students in Mathematics for their final theses or master theses. The teaching staff explains that UNAND follows the suggestions of the Indonesian Mathematical Society in designing their curricula, who also give guidelines for number of credit points the final thesis and master thesis and its accompanying seminars. However, the time spend on the bachelor thesis and master thesis remains unclear to the experts. Upon the question of the experts, the program coordinators mention that the master thesis is usually not conducted in collaboration with external partners. In rare cases, the students organize an outside collaboration themselves, which is supported by the supervisors. The industry representatives confirm that some students approach them to write a collaborative thesis with their company, but these are mainly bachelor thesis. In these cases, the students spent at least three month in the company to collect data. The experts further discuss the bachelor and master thesis with the teaching staff. In their experience, students work for six months on average for the master thesis whereas students spend around three months to complete their bachelor thesis. The experts emphasize that the workload of the bachelor and master thesis might not match the actual workload they described in the discussion. Thus, the experts continue point to issues regarding the workload of the students as describes in criterion 1.5.

The students explain to the experts that they are open to choose the topic of their bachelor and master thesis. They confirm that all regulations regarding the final theses is available

online. In addition, their academic adviser is available to explain regulations and give recommendations. The students further consider that they receive a solid introduction to scientific research methods and research tools. They highlight the courses “Research Methods” in the fifth semester of the bachelor program as well as “Research Method and Scientific Publication” in the first semester of the master program.

After reading the documentation and the interesting discussions during the on-site visit, the experts form the opinion that the exams at the two study programs under review are designed to allow the students to achieve the learning objectives of each module. All integrated assessment methods allow the students to receive feedback on the competencies that they have acquired. The experts confirm that writing a bachelor and master thesis is mandatory in the both study programs. The presented theses clearly represent EQF 6 and 7, respectively. The experts acknowledge that UNAND integrates various assessment methods in each module, which are explained to students. The experts learn that here are transparent rules for make-up exams, non-attendance, cases of illness. Although the experts consider the number of assessment during the semester as high, they ensure that the total workload is adequate. In their opinion, the organization of the exams are well managed and gives the students sufficient time to prepare. The experts conclude that the correction of assessment follows transparent criteria, which students can questions and appeal against. The experts approve UNAND’s validation system of examination questions and further describe that the exam questions are regularly reviewed. However, the experts express concern on the transparent decision on the assessment methods. They especially refer to Table 1.11 (ILO, Learning Methods, and Assessment Methods Matrix BM Courses; page 38) and 1.12 (ILO, Learning Methods, and Assessment Methods Matrix of MM Courses; page 39) in the self-assessment report. The experts suggest that UNAND should individually consider the ILO and improve the learning methods and assessment methods involved.

Final assessment of the experts after the comment of the Higher Education Institution regarding criterion 2:

The experts acknowledge that the presentation of the course learning outcomes is part of the module handbook. However, the experts emphasize that their comments about the intended learning outcomes, methods and assessment methods refers to the matrices presented in Table 1.11 and 1.12 in the self-assessment report in regard to the study programs. These tables intent to present the learning and assessment methods implemented to reach the intended learning outcomes of the study program. The experts’ decision on A2 remains unchanged.

3. Resources

Criterion 3.1 Staff and Staff Development

Evidence:

- Self-assessment report
- Staff handbook of each study program
- Module handbook of each study program
- Aus der Kapazitätsberechnung geht die verfügbare Lehrkapazität hervor.
- Discussion during the audit

Preliminary assessment and analysis of the experts:
UNAND summarizes that the teaching staff of the Department of Mathematics and Data Science involves 30 lecturers/professors supported by five academic sand administrative staff members. The university presents diagrams with the qualifications of teaching staff:

Figure 4. Composition of teaching staff at the Department of Mathematics and Data Science according to their qualifications (source: self-assessment report).

UNAND ensures that all lecturers involved in teaching in the master program *Mathematics* hold a PhD.

The representatives of the rector's office explain that the workload of all lectures is nationally regulated and varies between 12 and 16 credit points. The program coordinators add that one credit point is defined on university level. For lectures, the credit points of the course is equal to the credit point for the lecturer. Exceptions occur in classes with more than 40 students, where a factor of 1.3 is considered to compensate the higher workload e.g. when correcting assessments. The program coordinators state that on average, each lecturer teaches three courses per semester to reach the number of required teaching credits. For research, UNAND has established a metric to convert their activity to credit points. For example, they receive 20 credit points for one publication, where 60% are assigned to the first author. Similarly, UNAND had its own methods to convert community

service to credits. The teaching staff confirms that their personal workload is adequate. The teaching load strongly varies but is around 50% of their total time. Around 20% is reserved for research while the remaining time varies between administration, student supervision and community service. The lecturers inform the experts that UNAND does not have an official "sabbatical" but they have their ways to organize spending time outside UNAND. One is the "Equality program" where lecturers can spend up to three month at other universities. All other option allow shorter visits. The Head of the Department is responsible for managing the teaching load for the entire year. Once a lecturer has applied to send time outside UNAND, they have to discuss how to organize their compulsory teaching load of one semester balancing the teaching load of the different colleagues.

The program coordinators explain that the performance of each lecturer is measured based on the end-semester student evaluation. In addition, the faculty workload evaluation further analyzes if appropriate lecturers' workloads are realized and covers teaching, research and community service. Likewise, the head of the departments are responsible that the workload if each lecturer does not exceed a reasonable level, especially since many lectures teach across different departments. This evaluation takes place every semester. The program coordinators add that they practice team teaching in both study programs in all courses. Usually, there are three lecturers per course involved in the bachelor program and two each course of the master program. This also allows them to compensate if lecturers spend time outside UNAND. In this regard, they specify that there is a sufficient number of stuff member to cover the teaching load of the programs.

Nevertheless, the experts notice a significant drop of publications in 2023 as shown below:

Journal Publication	Year					
	2018	2019	2020	2021	2022	2023
National	70	219	106	83	30	8
International	29	109	61	63	9	3

Figure 5. Number of publications of the teaching staff in the Department of Mathematics and Data Science (source: self-assessment report).

The program coordinators admit that they encountered problems to perform research during the years of the COVID-19 pandemic. The restrictive research conditions at UNAND and the country did not allow them to continue their scientific activities according to plan, which caused the drop in their research output. They affirm to the experts that they returned to their usual research activities in their research groups, which will result in a higher number of research publication in the following years again.

According to the discussions during the on-site visit, UNAND describes that they have received higher autonomy in recruiting new staff with their transition to become an autonomous university. Therefore, it is still developing its recruiting strategy. In their current state, they can hire new staff members themselves without governmental control. In contrast to previous hiring (civil servants), new staff members will be employed as non-civil servants. They also hire contract-based professors/lecturers, which also include national and international professors. Foreign guest professors commonly visit UNAND for two to four weeks. The representatives of the industry confirm that they have joint lectures and that they collaborate in research. The experts acknowledge that in terms of research, most industry collaborations are in the field of data analysis and statistical problems. This also includes collaboration with the local government, where currently five alumni of UNAND's programs in Mathematics are employed as data analysis. The teaching staff confirms that the options for industry collaborations outside the field of statistics are quite limited. Currently, 16 lecturers from the research group of "Probability Theory and Statistics" have industry collaborations while the lecturers from pure mathematics struggle to find suitable partners.

The teaching staff describes to the experts that UNAND organizes regular workshops for all lecturers. There are two compulsory workshops, which each lecturer has to take at least once. One is called "Basic Instructional Techniques Improvement Program" and the second is called "Applied Approach." In the first course, the content focuses on all basics for teaching whereas the second addressed topics such as student assessment or developing a study plan. With these two courses, UNAND ensures that each lecturer knows the most important topics for teaching. The teaching staff adds that UNAND offers grants to voluntarily update their personal teaching skills. When a lecturer wants to take a course on new teaching methods, they send them to learn on this method; later they discuss if this method is suitable for their lectures. Furthermore, UNAND is also supportive for lectures, who wish to continue their studies by getting a PhD. According to the teaching staff, UNAND offers financial support. The teaching staff further explains to the experts that UNAND also offers a funding scheme for visiting conferences. Additional money can also be requested by the Ministry of Education, Culture, Research and Technology. However, the teaching staff points out that their research grants also often include funding to present their research at conferences. Each lecturer usually has at least one research grant from UNAND. These grants are competitive and involve internal and external reviewers; nevertheless, most are successful.

The experts acknowledge that the composition, professional orientation and qualification of the teaching staff are suitable for successfully delivering the study programs under review. The experts have the impression that UNAND offer sufficient human resources to ensure the organization of the study programs. This involves individual subject-specific and

general counselling, supervision and support of students as well as support in administrative and technical tasks. Although UNAND provides opportunities for staff development, the experts consider the number and topic quite limited. The experts highlight that a continued development of the lecturers' professional and didactic skills is important to ensure that the implemented teaching methods and applications are up-to-date. Therefore, the experts recommend UNAND to regularly review the teaching qualifications of each lecturer and ensure that they participate in courses on a regular basis. The experts would further advise that the teaching staff would also appreciate additional opportunities in staff development.

Criterion 3.2 Funds and equipment

Evidence:

- Self-assessment report
- Visitation of the campus during the on-site visit
- Discussion during the audit

Preliminary assessment and analysis of the experts:
According to the self-assessment report, the Department of Mathematics and Data Science receives funding from the university annually to cover routine budgets such as administration work, course and practice, and daily office expenses. The budget of the faculty further is responsible to maintain the facilities. The Department of Mathematics and Data Science operates two computer laboratories with 60 computers matching the needs to the bachelor and master program *Mathematics*.

In the discussion with the students and alumni, the experts learn that previously there was a shortage of computers on campus; however, this is already resolved. The alumni positively mention that UNAND has recently done many improvements to the campus facilities, which they appreciate. The students confirm that there are around 60 computers in the laboratories, as well as several technicians to support them. The experts approve that these technicians are employed by the university. According to the students, all computers have all adequate software installed, including MATLAB, Python, Maple, R Studio, and SPSS. The students add that these computers are also available for them while working on their final project or project-based assignments.

During the on-site visit, they experts further visit the central library of UNAND. The library provides the students with a high number of literature, including e-literature. Staff and students further have access to the most important journals in the field of *Mathematics*.

In addition, the students bring to the experts' attention that UNAND offers them sufficient areas to work on assignment, including places suitable for group work. The master students add that they have additional access to a discussion room, which they consider as very useful. Although the students consider the facilities overall as suitable for studying, they explain to the experts that they would wish to have several smart white boards in addition to the traditional black boards. They would really appreciate such for group discussions.

The experts conclude that the financial resources and the available equipment allows UNAND to deliver the study programs in good quality. The infrastructure is available in a sufficient quality and quantity and allows the students to practice up-to-date skills in the computer laboratories. Furthermore, the experts consider that UNAND provides suitable surrounding for the students to learn. However, the experts support the students' suggestions to consider buying smart white boards, as these would provide a basis for group work and discussions.

Final assessment of the experts after the comment of the Higher Education Institution regarding criterion 3:

Ad criterion 3.1.

The experts appreciate UNAND's explanation given in their statement. Nevertheless, the experts consider that it is important for the future development of their study program as well as their contribution to applied research to expand the staff's collaboration with industry partners. The experts therefore decide on the recommendation E1.

In addition, the experts appreciate that UNAND offers programs for staff development in terms of pedagogy. However, the experts consider that the number of participants in regular staff development programs should increase to ensure teaching remains on a high and international level. They encourage the staff to take part in workshops or courses on pedagogy on a regular basis as summarized in the recommendation E3.

Ad criterion 3.2.

UNAND describes in its statement that they want to accommodate the students' suggestion to purchase smart boards for their discussion rooms. Although the experts appreciate UNAND's statement, the recommendation E4 remains in place.

4. Transparency and Documentation

Criterion 4.1 Module Descriptions

Evidence:

- Module handbook of each study program
- Discussion during the audit

Preliminary assessment and analysis of the experts:

The experts acknowledge that UNAND organizes module handbooks for each study program under review. However, the experts identify several issues with the presented module handbooks, which need to be improved. The experts emphasize that the current version of both module handbooks does not include module descriptions for all modules whereas some modules only miss descriptions. The experts further suggest that it would be helpful to provide an overview at the beginning of the module handbook to find an overview of the modules included in the study process and has the opportunity to access them easily. In addition, the experts consider that the assessment methods and the teaching methods in the course need to be clarified to increase transparency to the students and need to reflect the practice in the classroom. Finally, the experts consider that some of the literature in the reading lists is outdated and should therefore be updated in a revision of the module handbooks.

Criterion 4.2 Diploma and Diploma Supplement

Evidence:

- Self-assessment report
- Examples of Diploma certificates
- Examples of Diploma Supplements
- Examples of Transcript of Records
- Discussion during the audit

Preliminary assessment and analysis of the experts:

After studying the submitted documents, the experts confirm that UNAND issues a diploma certificate shortly after graduation, which is accompanied by a diploma supplement and a transcript of records. The diploma supplement contains all necessary information about the degree program (PLOs, general skills, specific skills and knowledge) including acquired

achievements, awards, and activities (extracurricular and co-curricular activities). The Transcript of Records lists all the courses that the graduate has completed, the achieved credits, grades, cumulative GPA, and mentions the seminar and thesis titles. The master students and alumni confirm to the experts that the Diploma Supplement and Transcript of Records are always issued in English and Bahasa Indonesia.

Criterion 4.3 Relevant Rules

Evidence:

- Self-assessment report
- Webpage https://www.unand.ac.id/
- Webpage https://akademik.unand.ac.id/produk-hukum

Preliminary assessment and analysis of the experts:

UNAND describes in their self-assessment report that every student has the same rights and obligations, which are regulated by the rector's regulations. In addition, UNAND has presented several additional standard operating procedures. These documents clearly define the responsibility of UNAND, the teaching staff, and the students. Rules are also in place to manage campus life and regulation access to scholarships. Rights and obligations of students are published in Bahasa Indonesia to ensure national and international students have access to information. The experts confirm that guidelines and regulations are available online for all students, teachers, and third parties. However, the experts remark that most of the documents on the webpage are not available in English.

Final assessment of the experts after the comment of the Higher Education Institution regarding criterion 4:

UNAND describes in its statement that it recently provided English translations of several important documents on their webpage, including for examples the guidelines for the final project, appeal regulations and the academic calendar.

In addition, the experts request UNAND to provide updated and complete module handbooks as described in the requirement A3.

5. Quality management: quality assessment and development

Criterion 5 Quality management: quality assessment and development

Evidence:

- Self-assessment report
- Discussion during the audit

Preliminary assessment and analysis of the experts:

The experts observe in the submitted documentation and the discussions during the on-site visit that UNAND has implemented a quality assurance system consisting of an internal quality assurance system and external quality assurance methods. UNAND has issues a quality assurance policy, which was updated in 2023. The representatives of the rector's office explain to the experts that UNAND has established specific units for internal quality management on different levels of the university. Generally, UNAND conducts both internal and external quality reviews. Most surveys are conducted in the university's online system to facilitate the analysis and distribution of results. According to the representatives of the rector's office, all students can access the results of the surveys they participated in their online system. This also includes information on the next takes for improvement. In its self-assessment report, UNAND also presents the points of criticism during the last annual program reviews based on a zero to four rating scale. According to this data, the students in the master and bachelor program *Mathematics* show a very high satisfaction with their education and the facilities in the most recent years. Improvements can be traced in the bachelor program, where the students' ratings increased in the fields of research, community services, and infrastructure. UNAND further explains in its documents that it measures the quality of its graduates based on the assessment of achieving the ILOs of each module. These reviews are conducted each semester based on a rubric created considering the students' evaluation. Additional surveys are organized with stakeholders, including among others graduates, alumni, lecturers, students, users, and partners from the industry.

The representatives of the rector's office clarify that students are also part of different decision-making bodies. For example, students are included in the Board of Trustees (one student representative) as well as in quality management on faculty level. In addition, students are organized in student unions, which closely collaborate with the deans and heads of department. However, they admit that these collaborations are not organized in official boards of committees.

In the discussion with the students, the experts acknowledge that they take part in an end-semester survey to evaluate the lecture and the lecturer. These surveys are mandatory and conducted online. The students describe that each survey has questions give their feedback based on rating-questions as well as open spaces to write free text. According to the students in the discussion, they are free to comments and personally often raise criticism in their surveys. However, they admit that they do not receive the results of these surveys and also do not know if there is a way to access them.

The students mention that to the experts that in a case the lecturer does not perform well, they can additionally contact their academic advisors. This is the first person they can officially raise a complaint. They are also welcome to address the dean directly is the issues remains unresolved.

In conclusion, the experts acknowledge that UNAND has established a well working quality assurance. The internal quality assurance unit is responsible to periodically review the study programs under review. The experts approve that the results of the surveys are incorporated to develop the study programs. However, the experts notice that the students are unaware of the results of the surveys they participate. In contrast, the representatives of the rector's state that students have access to the results. The experts note that UNAND needs to make the students aware of the results of their evaluations. Furthermore, students also should be notified on the improvements planned based on the students' feedback.

Final assessment of the experts after the comment of the Higher Education Institution regarding criterion 5:

According to UNAND's statement, students will be informed on the results of the end-semester evaluation via their students' online system. The experts appreciate this progress, but continue to issue the recommendation A4. They ask UNAND to provided evidences documenting that this has been implemented in the upcoming semester. In addition, the experts highlight that it would be important to inform the students not only on the results of the survey, but also gives information of the actions taken if issues were detected.

D Additional Documents

Before preparing their final assessment, the panel ask that the following missing or unclear information be provided together with the comment of the Higher Education Institution on the previous chapters of this report:

D 1. Study plan for the bachelor program covering 8 semester
D 2. Study plan for the master program covering 4 semester
D 3. Conversion of the CPs to ECTS credits in the master program

E Comment of the Higher Education Institution (16.05.2024)

The institution provided a detailed statement:

THE DEGREE PROGRAMME: CONCEPT, CONTENT & IMPLEMENTATION

Objectives and Learning Outcomes of a Degree Programme (Intended Qualifications Profile)

No.	Expert Accreditation Report	Response
1	...the experts recommend to continue to expand their collaborations with companies and agencies. This should include collaboration in reaching as well as in research. **[Criterion 1.1 Page 12]**	BM and MM Study Programs have increased cooperation and collaboration with several national level companies and institutions, including: 1. Internship for BM and MM students at PT. Semen Padang in early 2024 (Internship report attached: https://drive.google.com/file/d/1rpdQOiyit5LehkKOpcr5RCbnNG-NqsTm/view?usp=sharing); 2. Collaborative research between BM and MM Study Program lecturers with the Meteorology, Climatology and Geophysics Agency in 2023 (MoU attached: https://docs.google.com/document/d/1tgQhh1BwK0O8Ii-p4FeNRkZlEgJ2VL7n/edit?usp=sharing&ouid=101784468324806506070&rtpof=true&sd=true); 3. Collaboration of research and teaching process of BM and MM study program lecturers with the Indonesian Open University in 2023 (MoU attached: https://drive.google.com/file/d/1MFjvU6_hDKNLSyh8qDDXoiWe-Qqx9m9x/view?usp=sharing);

		4. Collaboration of research and teaching of BM and MM Study Program lecturers with the Faculty of Science and Technology, Airlangga University in December 2023 (MoU attached: https://drive.google.com/file/d/1pZLt_e75ReRo_5_VKg5BEBPfM1DwhWJO/view?usp=sharing); 5. Collaboration of Tri Dharma Higher Education with FMIPA Gadjah Mada University in 2023 (MoU attached: https://drive.google.com/file/d/1_xYkpJzy-dYVJEKmzXRJ9Tcvzi-cuwvUmq/view?usp=sharing); 6. Tri Dharma Collaboration for FMIPA, University of Indonesia in 2022 (MoU attached: https://drive.google.com/file/d/1g278ORCx-VMqldpfqAATOnBTzr4T-0Y2/view?usp=sharing). Furthermore, the BM and MM Study Program is determined to continue to increase cooperation and collaboration with various companies and national institutions in the following years, one of which is through the Enhancing Quality Education for International University Recognition (EQUITY) program organized by Andalas University.

Name of the degree programme

No.	Expert Accreditation Report	Response
1	…, the experts observe that the study program names were consistently used in the teaching language of the programs as well as in English. **[Criterion 1.5 Page 13]**	Thankyou for the comment

Curriculum

No.	Expert Accreditation Report	Response
1	Although the experts acknowledge the shorter study duration of gifted students, they highlight that UNAND needs to provide a curricular overview, including a reasonable number of modules for each semester, which an average student can follow. This overview needs to correctly represent the workload of each semester with an adequate workload for the students expressed in the number of credits points. Moreover, the workload of the final thesis needs to be expressed. **[Criterion 1.3 Page 15]**	The Undergraduate Mathematics Study Program has distributed credits and courses in each semester for eight semesters, namely Curriculum Structure. The curriculum structure can be seen on the Mathematics Undergraduate Study Program website (http://matematika.fmipa.unand.ac.id/sarjana/trukmata-kuliah-dan-modul-handbook/ and http://matematika.fmipa.unand.ac .id/sarjana/curricullaroverview/) which can be accessed by all students, lecturers and stakeholders.
2	The experts raise several questions on the content and order of the courses of the bachelor program. This includes for example, the obligatory courses in natural science in the early semesters or differences in “Calculus” and “Real Analysis.” The experts further aim to understand which courses are related and which are prerequisites for others. In the opinion of the experts, the program coordinator should give then a sufficient insight into their motivation of their course structure. In addition, they could also address the experts’	Calculus is divided into 3 courses, namely Calculus 1, 2, and 3. The Calculus 1 course is a prerequisite for Calculus 2, and so on. Even though some of the Calculus 1 course material is similar to Real Analysis material, there are significant differences in the two courses. The difference is in the aspect of the intended learning outcomes of the two courses. In the Calculus course, more emphasis is placed on students' ability to calculate and understand the sufficient conditions for when a method can be used. Meanwhile, in the Real Analysis course, more emphasis is placed on how to provide arguments in each step of the solution in a structured and correct manner.

	concern concerning module content and qualifications. **[Criterion 1.3 Page 16]**	
3	Although the experts acknowledge the historical significance of programing languages such as "Turbo Pascal" but emphasize that it should not be part of a modern curriculum. **[Criterion 1.3 Page 17]**	Based on the results of discussions by the teaching team and the BM Study Program, the Turbo Pascal programming language will be replaced by the C++ and Python programming languages, both in learning and practicum. This can be seen in the study plan and Module Handbook (Algorithms and Programming course: https://docs.google.com/document/d/1hQIhzcnhUOicHvFWx6P9Fnb_4DZAXJFP/edit?usp=sharing&ouid=101784468324806506070&rtpof=true&sd=true)
4	Although the industry representatives show a high satisfaction of the students' skills in data analysis, they add that certain applied methods and software might be outdated in their option. They suggest especially focusing on topics such as machine learning and artificial intelligence. **[Criterion 1.3 Page 17, 18]**	In the Computational Statistics, Data Science and Introduction to Artificial Intelligence courses, students have learned about machine learning and artificial intelligence topics accompanied by the use of R Studio and Python software. The study plan and Module Handbook for the course are attached (https://docs.google.com/document/d/1zXq4DwSTuZgnwwHWmjj8Mj6ZZR48G9WV/edit?usp=sharing&ouid=101784468324806506070&rtpof=true&sd=true, https://docs.google.com/document/d/1SyXjYV_cFuMHqFkIW-6X_AtELqUnxFnq/edit?usp=sharing&ouid=101784468324806506070&rtpof=true&sd=true,).
5	The experts therefore request new module descriptions, which show adequately, which methods are integrated in the modules including references to the applied software.	The study plan and Module Handbook for Algorithms and Programming courses have been updated (https://docs.google.com/document/d/1hQIhzcnhUOicHvFWx6P9Fnb_4DZAXJFP/ed

	[Criterion 1.3 Page 17]	it?usp=sharing&ouid=101784468324806506070&rtpof=true&sd=true).
6	In the opinion of the experts, the number of internships in the bachelor and master program should be increased. They advise that UNAND should promote and support the students in taking internships. This might include offering them several partner companies/institutions who regularly receive students. In addition, the university should transparently explain to the students the benefits of a three to six month internship, which can fully be credited within the MBKM program. **[Criterion 1.3 Page 17]**	The latest data shows that apprenticeship participants through MBKM have increased, namely (Data attached: https://docs.google.com/spreadsheets/d/1D4Xb6oC6SLBE7VvzmnO3tEi0x9ej07zy/edit?usp=sharing&ouid=101784468324806506070&rtpof=true&sd=true). Information about the MBKM program can be accessed by students on the Andalas University MBKM website (https://pdk.unand.ac.id/index.php/program/program-mbkm).
7	Nevertheless, the experts highlight that the presented documentation does not give a clear picture of the structure of the study programs. The experts remind UNAND that the presented study plan needs to give a clear overview of the courses, which the average students should take in each semester. **[Criterion 1.3 Page 19]**	Study plan attached (BM: https://drive.google.com/drive/folders/1wXMk3ZwqdNpCHg-BieGHfReF4V7_HH3SL?usp=sharing, MM: https://drive.google.com/drive/folders/120VbqoN-L6f6j7cIO7Rw51DiM-lWZyh2P?usp=sharing).
8	However, the experts point out that UNAND could work on a greater variety of internships in the different fields of mathematics. This should involve a higher	Collaboration with industry in various other fields will be carried out with the MBKM Program.

	number of collaborations partners from different fields of industries. **[Criterion 1.3 Page 19]**	
9	Although they approve that the current five specializations offered by UNAND match the fields of research by the staff members, the experts consider to divide the students only in three groups. This groups should follow the internationally standard divisions in the field of (1) pure mathe-matics, (2) applied mathematics and (2) statistics. In the opinion of the experts, an attempt to restructure the program specialization to internationally recognized terminology would further allow the students of pure mathematics to form larger groups. **[Criterion 1.3 Page 19]**	From the human resources aspect, the Department is divided into 5 KBK which results in the grouping of subject teachers and research areas. In addition, fast track students from Bachelor's to Master's degrees, their research must be in line with research that has been carried out in Bachelor's degree.
10	The experts encourage UNAND to establish a higher number of student exchange programs with foreign universities to allow them to gain experience abroad and provide information to students. **[Criterion 1.3 Page 20]**	Andalas University has created the Enhancing Quality Education for International University Recognition (EQUITY) program in 2024 to increase cooperation and collaboration with universities abroad (https://unand.ac.id/index.php/berita/9-seputar-unand /794-equity-unand-ut.html)

Admission requirements

No.	Expert Accreditation Report	Response
1	The experts summarize that UNAND has established admission requirements and	Thankyou for the comment

	procedures, which are binding and transparent. Rules for the recognition of qualifications achieved externally (e.g. at other higher education institutions or outside the higher education sector) are clearly defined. **[Criterion 1.5 Page 23]**	

Workload and Credits

No.	Expert Accreditation Report	Response
1	The experts emphasize that UNAND needs to address this issue and present a conversion presenting an adequate workload in ECTS credits for the master program Mathematics. **[Criterion 1.5 Page 25]**	The curriculum structure for the MM Study Program can be seen in the attachment (http://matematika.fmipa.unand.ac.id/magister/curricular-overview/).
2	The experts highlight, that UNAND needs to improve the presentation of the workload of the bachelor and master thesis and start to adequately monitor how much time students spend on their thesis (including research). Furthermore, also the conversion of the total workload of the master thesis needs to be questioned. **[Criterion 1.5 Page 25]**	The BM Study Program has informed about the workload for final assignments via the BM Study Program website (http://matematika.fmipa.unand.ac.id/sarjana/curricullar-overview/). Likewise with the MM Study Program which is displayed on the MM Study Program website (http://matematika.fmipa.unand.ac.id/magister/curricular-overview/).
3	However, the experts identify the need to update the conversion of ECTS credit points in the	The conversion of CPs to ECTS for Masters in Mathematics can be seen in the attachment (http://matematika.fmipa.unand.ac.id/magister/curricular-overview/).

	master program (see also criterion 2). **[Criterion 1.5 Page 26]**	

Didactics and Teaching Methodology

No.	Expert Accreditation Report	Response
1	The experts suggest that UNAND should individually consider the ILO and improve the learning methods and assessment methods involved. **[Criterion 1.5 Page 27]**	ILO, the learning methods and assesment method used are mentioned in the study plan for all courses. And this is different for each course.

EXAMS: SYSTEM, CONCEPT & ORGANIZATION

No.	Expert Accreditation Report	Response
1	The experts conclude that the correction of assessment follows transparent criteria, which students can questions and appeal against. The experts approve UNAND's validation system of examination questions and further describe that the exam questions are regularly reviewed. However, the experts express concern on the transparent decision on the assessment methods. They especially refer to Table 1.11 (ILO, Learning Methods, and Assessment Methods Matrix BM Courses; page 38) and 1.12 (ILO, Learning Methods, and Assessment Methods Matrix of MM Courses; page 39) in the self-assessment report. The	The assessment criteria and weights for each ILO assessment method have been described in the study plan in the weekly study plan and assessment plan sections.

	experts suggest that UNAND should individually consider the ILO and improve the learning methods and assessment methods involved. **[Criterion 2 Page 31]**	

RESOURCES

No.	Expert Accreditation Report	Response
1	The experts acknowledge that the composition, professional orientation and qualification of the teaching staff are suitable for successfully delivering the study programs under re view. The experts have the impression that UNAND offer sufficient human resources to ensure the organization of the study programs. This involves individual subject-specific and general counselling, supervision and support of students as well as support in administrative and technical tasks. Although UNAND provides opportunities for staff development, the experts consider the number and topic quite limited. The experts highlight that a continued development of the lecturers' professional and didactic skills is important to ensure that the implemented teaching methods and applications are up-to-date. Therefore, the experts recommend UNAND to regularly review the teaching qualifications of each lecturer and ensure that they participate in courses on a regular basis. The experts	BM and MM study programs improve the didactic skills of UNAND lecturers, not only providing PEKERTI and Applied Approach (AA) training but there are many other training offered but they are not mandatory like these two trainings. In Table 3.1 below, the types of skill development activities participated in by lecturers in the BM and MM Study Programs are explained. Activities in 2020 are still small compared to 2021 and 2022. This is because that year was the beginning of COVID-19 so many activities were not carried out. Meanwhile, the data for 2023 is also small because the data collected is one semester's data.

	would further advise that the teaching staff would also appreciate additional opportunities in staff devel opment. **[Criterion 3 Page 29]**	
2	The experts conclude that the financial resources and the available equipment allows UNAND to deliver the study programs in good quality. The infrastructure is available in a sufficient quality and quantity and allows the students to practice up-to-date skills in the computer laboratories. Furthermore, the experts consider that UNAND provides suitable 35 C Expert Report for the ASIIN Seal surrounding for the students to learn. However, the experts support the students' sugges tions to consider buying smart white boards, as these would provide a basis for group work and discussions. **[Criterion 3 Page 35]**	The BM and MM Study Program plans to purchase smart whiteboards in next year's financial budget.

Table 3.1 Data of Activities for Developing Didactic Skills of DMSD Lecturers

No	Field	Number of Staff			
		2020	2021	2022	2023
1	Learning methods	12	10	9	1
2	Curriculum Preparation	9	20	6	1
3	Algebra	19	11	14	13
4	Analysis and Geometry	2	0	10	6
5	Combinatorics	2	19	11	3
6	Applied Mathematics	1	7	8	5

7	Statistics and Probability Theory	6	21	8	10
8	Other Sciences	8	6	14	5
9	Scientific writing and research proposals	7	16	22	8
10	Entrepreneurship	0	8	1	1
11	Information Technology	1	10	16	7
Total		67	128	119	60

F Summary: Expert recommendations (31.05.2024)

Taking into account the additional information and the comments given by three the experts summarize their analysis and **final assessment** for the award of the seals as follows:

Degree Programme	ASIIN Seal	Maximum duration of accreditation	Subject-specific label	Maximum duration of accreditation
Ba Mathematics	With requirements for one year	30.09.2029	–	-
Ma Mathematics	With requirements for one year	30.09.2029	–	-

Requirements

For all degree programs

A 1. (ASIIN 1.5) Ensure that the student workload of the bachelor and master thesis matches the awarded number of credit points.

A 2. (ASIIN 1.6 & 2) Develop a new overview presenting the learning outcomes, learning methods and assessment methods.

A 3. (ASIIN 4.1) Prepare complete module handbooks with adequate module descriptions, up-to date list of relevant literature references and teaching and assessment methods reflection the conditions applied in the classroom.

A 4. (ASIIN 5) The students, who take part in surveys and questionnaires, are entitled to receive feedback on the results and the actions derived from these results.

For the Master's degree programme

A 5. (ASIIN 1.5) Review the conversion of Indonesian credit points to ECTS credits.

Recommendations

For all degree programs

E 1. (ASIIN 1.1, 1.3 and 3.1) It is recommended to extent the number of partners and strengthen the collaboration with the industry.
E 2. (ASIIN 1.3) It is recommended to increase the international student mobility.
E 3. (ASIIN 3.1) UNAND is encouraged to organize a larger number of staff development courses to its academic staff, particularly on pedagogy.
E 4. (ASIIN 3.2) It is recommended to purchase smart white boards for the discussion rooms.

For the Bachelor's degree programme

E 5. (ASIIN 1.3) It is recommended to increase the number of students taking part in long-term internships (three to six months).

G Comment of the Technical Committee 12 – Mathematics (11.06.2024)

Assessment and analysis for the award of the ASIIN seal:

The Technical Committee discusses the requirements and recommendations in detail. The Technical Committee consider that the university has already taken the first steps towards improving the technical equipment for discussions; thus, the recommendation E4 can be deleted. The members highlight that the requirement A4 regarding the student feedback should be changed to a recommendation. The report clearly states that the program coordinators mention that students have access to the results of their end-semester evaluations; however, the students in the discussions are unaware of this. The Technical Committee rephrases the case to the new recommendation E4. Moreover, the Technical Committee emphasizes that the correct term in the recommendation E3 should be “didactics” instead of “pedagogy”; it rephrases the recommendation E3 accordingly.

The Technical Committee 12 – Mathematics recommends the award of the seals as follows:

Degree Programme	ASIIN Seal	Maximum duration of accreditation	Subject-specific label	Maximum duration of accreditation
Ba Mathematics	With requirements for one year	30.09.2029	–	-
Ma Mathematics	With requirements for one year	30.09.2029	–	-

Requirements

For all degree programs

A 1. (ASIIN 1.5) Ensure that the student workload of the bachelor and master thesis matches the awarded number of credit points.

A 2. (ASIIN 1.6 & 2) Develop a new overview presenting the learning outcomes, learning methods and assessment methods.

A 3. (ASIIN 4.1) Prepare complete module handbooks with adequate module descriptions, up-to date list of relevant literature references and teaching and assessment methods reflection the conditions applied in the classroom.

For the Master's degree program

A 4. (ASIIN 1.5) Review the conversion of Indonesian credit points to ECTS credits.

Recommendations

For all degree programs

E 1. (ASIIN 1.1, 1.3 and 3.1) It is recommended to extent the number of partners and strengthen the collaboration with the industry.

E 2. (ASIIN 1.3) It is recommended to increase the international student mobility.

E 3. (ASIIN 3.1) UNAND is encouraged to organize a larger number of staff development courses to its academic staff, particularly on didactics.

E 4. (ASIIN 5) It is recommended to inform the students, who take part in the end-semester survey, about their online access to the results of the surveys. Furthermore, it is recommended to also communicate the measures implied by the surveys.

For the Bachelor's degree program

E 5. (ASIIN 1.3) It is recommended to increase the number of students taking part in long-term internships (three to six months).

H Decision of the Accreditation Commission (28.06.2024)

Assessment and analysis for the award of the ASIIN seal:

Mrs. Kern describes the accreditation procedure.

The Accreditation Commission discusses the requirements and recommendations and follows the assessment of the auditor and the suggestions from the Technical Committee 12. In addition, it decides on editorial corrections in E1 and E2.

The Accreditation Commission decides to award the following seals:

Degree Programme	ASIIN Seal	Maximum duration of accreditation	Subject-specific label	Maximum duration of accreditation
Ba Mathematics	With requirements for one year	30.09.2029	–	-
Ma Mathematics	With requirements for one year	30.09.2029	–	-

Vote: unanimous

Requirements

For all degree programs

A 6. (ASIIN 1.5) Ensure that the student workload of the bachelor and master thesis matches the awarded number of credit points.

A 7. (ASIIN 1.6 & 2) Develop a new overview presenting the learning outcomes, learning methods and assessment methods.

A 8. (ASIIN 4.1) Prepare complete module handbooks with adequate module descriptions, up-to date list of relevant literature references and teaching and assessment methods reflection the conditions applied in the classroom.

For the Master's degree program

A 9. (ASIIN 1.5) Review the conversion of Indonesian credit points to ECTS credits.

Recommendations

For all degree programs

E 6. (ASIIN 1.1, 1.3 and 3.1) It is recommended to extend the number of partners and strengthen the collaboration with industry.

E 7. (ASIIN 1.3) It is recommended to increase international student mobility.

E 8. (ASIIN 3.1) UNAND is encouraged to organize a larger number of staff development courses to its academic staff, particularly on didactics.

E 9. (ASIIN 5) It is recommended to inform the students, who take part in the end-semester survey, about their online access to the results of the surveys. Furthermore, it is recommended to also communicate the measures implied by the surveys.

For the Bachelor's degree program

E 10. (ASIIN 1.3) It is recommended to increase the number of students taking part in long-term internships (three to six months).

Appendix: Programme Learning Outcomes and Curricula

According to self-assessment report, graduates of the bachelor study program *Mathematics* shall achieve the following educational objectives and intended learning outcomes (intended qualifications profile):

Educational objectives (EO):

EO 1	Graduates are expected to be problem solvers and leaders in their work.
EO 2	Graduates are expected to do continuous learning and research, and to participate actively in the development of mathematics and the applications of mathematics.
EO 3	Graduates are expected to create jobs in society with their creativity and innovation.

Indented learning outcomes (ILO):

ILO 1	Possesses good ethics and integrity.
ILO 2	Possesses profound knowledge of the basic concept of mathematics.
ILO 3	An ability to identify, explain and generalize simple mathematics.
ILO 4	An ability to use concepts and fundamental techniques of mathematics in solving simple mathematical problems.
ILO 5	An ability to formally and correctly prove simple mathematical statements using facts and methods that have been studied.
ILO 6	Have ability in data literacy and technology and can apply them in solving simple mathematical problems or other relevant fields.
ILO 7	An ability to communicate effectively especially in the area of mathematics with diverse communities.
ILO 8	An ability to work in a team.
ILO 9	An ability to apply knowledge of mathematics in a career and involve in lifelong learning.

The following **curriculum** is presented:

1st Semester

Code	Course Name	Credit (CP)	ECTS*	Workload**	
				Hours in class	Hours Self-Study
MWU60101	Religion	2	3,02	26,67	64
MWU60104	Indonesian Language	2	3,02	26,67	64
MAT61105	Basic Physics	2	3,02	26,67	64
MAT61106	Basic Chemistry	2	3,02	26,67	64
MAT61101	English for Mathematics	2	3,02	26,67	64
MAT61121	Calculus 1	3	4,53	40	96
MAT61111	Introduction to Mathematics	3	4,53	40	96
MAT61151	Data Analysis	3	4,53	40	96
Sub-Total		**19**	**28,69**	**252,33**	**608**

2nd Semester

Code	Course Name	Credit (CP)	ECTS*	Workload**	
				Hours in class	Hours Self-Study
MWU60102	Pancasila (State Ideology)	2	3,02	26,67	64
MWU60103	Civic Educations	2	3,02	26,67	64
MAT62111	Elementary Linear Algebra	3	4,53	40	96
MAT62121	Calculus 2	4	6,04	53,33	128
MAT62122	Analytical Geometry	2	4,53	40	96
MAT62131	Discrete Mathematics	4	6,04	53,33	128
MAT62141	Algorithms and Programming	3	4,53	40	96
Sub-Total		**21**	**31,71**	**280**	**672**

3rd Semester

Code	Course Name	Credit (CP)	ECTS*	Workload**	
				Hours in class	Hours Self-Study
MAT61122	Calculus 3	4	6,04	53,33	128
MAT61123	Complex Function 1	2	3,02	26,67	64
MAT61141	Linear Programming	3	4,53	40	96
MAT61142	Ordinary Differential Equations	3	4,53	40	96
*MAT… /XXX… /AND…	Electives	9	13,59	120	288
Sub-Total		**21**	**31,71**	**280**	**672**

4th Semester

Code	Course Name	Credit (CP)	ECTS*	Workload**	
				Hours in class	Hours Self-Study
MAT62112	Algebraic Structures	3	4,53	40	96
MAT62123	Complex Functions 2	2	3,02	26,67	64
MAT62124	Real Analysis 1	3	4,53	40	96
MAT62142	Numerical Methods	4	6,04	53,33	128
MAT62143	Introduction to Partial Diffrential Equation	3	4,53	40	96
MAT62151	Mathematical Statistics 1	3	4,53	40	96
*MAT… /XXX… /AND…	Elective	3	4,53	40	96
Sub-Total		**21**	**31,71**	**280**	**672**

5th Semester

Code	Course Name	Credit (CP)	ECTS*	Workload**	
				Hours in class	Hours Self-Study
AND60102	Enterpreneurship	3	4,53	40	96
MAT61102	Research Method	2	3,02	26,67	64
MAT61112	Linear Algebra	3	4,53	40	96
MAT61124	Real Analysis 2	3	4,53	40	96
MAT61143	Mathematical Modeling	4	6,04	53,33	128
MAT61152	Mathematical Statistics 2	3	4,53	40	96
*MAT… /XXX… /AND…	Elective	3	4,53	40	96
Sub Total		**21**	**31,71**	**280**	**672**

6th Semester

Code	Course Name	Credit (CP)	ECTS*	Workload**	
				Hours in class	Hours Self-Study
*MAT… /XXX…	Elective	20	9,054	266,67	640
/AND…					
Sub-Total		**20**	9,054	**266,67**	**640**

7th Semester

Code	Course Name	Kredit (CP)	ECTS*	Workload**	
				Hours in class	Hours Self-Study
AND60101	Student Community Service	4	6,04	53,33	128
*MAT… /XXX… /AND…	Elective	9	13,59	120	288
Sub-Total		**13**	19,63	**173,33**	**416**

8th Semester

Code	Course Name	Kredit (CP)	ECTS*	Workload**	
				Hours in class	Hours Self-Study
MAT60103	Final Project 1	4	6,04	53,33	128
MAT60104	Seminar	1	1,51	13,33	32
MAT60105	Final Project 2	3	4,53	40	96
Sub-Total		**8**	**12,08**	**106,67**	**256**

According to self-assessment report, graduates of the master study program ***Mathematics*** shall achieve the following educational objectives and intended learning outcomes (intended qualifications profile):

Educational objectives (EO):

EO 1	Graduates are expected to be problem solvers, leaders, independent, and adaptive in their field of work.
EO 2	Graduates are expected to develop science and scientific techniques in solving problems in the field of work.
EO 3	Graduates are expected to develop a career through continuous learning.

Indented learning outcomes (ILO):

PLO 1	Possesses good ethics and integrity.
PLO 2	Mastering mathematical concepts and applications (real analysis, advanced linear algebra, and statistics) in solving complex mathematical problems.
PLO 3	Comprehensive mastery of one or several theories for development in the fields of analysis, algebra, applied mathematics, statistics and combinatorial

	mathematics.
PLO 4	Mastering scientific techniques and developing them in solving research problems through multidisciplinary or interdisciplinary approaches.
PLO 5	Able to work and conduct research in the field of mathematics and related fields of science by developing the latest issues independently or collaboratively and communicating them academically.
PLO 6	Able to be actively involved in lifelong learning and sustainability.

The following **curriculum** is presented:

1st Semester

Code	Course Name	Credit	ECTS*	Workload**	
				Hours in class	Hours Self-Study
MAT81101	Research Method and Scientific Publication	3	4,53	40	96
MAT81111	Advanced Linear Algebra	3	4,53	40	96
MAT81121	Advanced Real Analysis	3	4,53	40	96
MAT81131	Probability Theory	3	4,53	40	96
Sub-Total		**12**	**18,12**	**160**	**384**

2nd Semester

Code	Course Name	Credit	ECTS*	Workload**	
				Hours in class	Hours Self-Study
MAT82141	Dynamic System	3	4,53	40	96
MAT82151	Combinatoric Theory	3	4,53	40	96
MAT80101	Research Proposal	2	3,02	26,67	64
MAT….	Elective Course	6	9,06	80	192
Sub-Total		**14**	**21,14**	**186,67**	**448**

3rd Semester

Code	Course Name	Credit	ECTS*	Workload**	
				Hours in class	Hours Self-Study
MAT80102	Seminar	2	3,02	26,67	64
MAT…	Elective Course	6	9,06	80	192
MAT80103	Thesis 1	3	4,53	40	96
MAT80104	Thesis 2	3	4,53	40	96
Sub-Total		**14**	**21,14**	**186,67**	**448**