ASIIN Seal
Accreditation Report

Master's Degree Programme
Mathematics Education
Science Education

PhD Programme
Mathematics Education
Science Education

Provided by
Universitas Negeri Surabaya

Version: 05.04.2024

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 Magister Pendidikan Matematika	Master Program of Mathematics Education	ASIIN	LAMDIK 28.12.2022 – 27.12.2027	12
Program Doktoral Pendidikan Matematika	Doctoral Program of Mathematics Education	ASIIN	BAN-BT 25.05.2021 – 25.05.2026	12
Program Magister Pendidikan Sains	Master Program of Science Education	ASIIN	LAMDIK 20.12.2022 – 19.12.2027	09, 10, 13
Program Doktoral Pendidikan Sains	Doctoral Program of Science Education	ASIIN	BAN-PT 07.09.2021 – 07.09.2026	09, 10, 13

Date of the contract: 13.04.2022

Submission of the final version of the self-assessment report: 07.04.2023

Date of the onsite visit: 19.-20.10.2023

at: Ketintang Campus and Lidah Wetan Campus

Expert panel:

Prof. Drs. Jaslin Ikhsan, :M.App.Sc, Ph.D. Universitas Negeri Yogyakarta

Prof. Dr. Andreas Müller, University of Geneva

Prof. Dr. Ratu Ilma Indra Putri, M.Si., Sriwijaya University

Prof. Dr. Hans-Georg Weigand, University of Würzburg

Alexandra Dreiseidler, Emil-Fischer Gymnasium in Euskirchen

[1] ASIIN Seal for degree programs

[2] TC: Technical Committee for the following subject areas: TC 09 - Chemistry; TC 10 - Life Sciences; TC 12 - Mathematics; TC 13 - Physics.

Aris Singgih Budiarso, PhD student at Universitas Jember
Representative of the ASIIN headquarter: Andrea Kern
Responsible decision-making committee: Accreditation Commission for Degree Programmes
Criteria used: European Standards and Guidelines as of May 15, 2015 ASIIN General Criteria, as of December 10, 2015 Subject-Specific Criteria of Technical Committee 09 – Chemistry, Pharmacy as of March 29, 2019 Subject-Specific Criteria of Technical Committee 10 – Life Sciences as of June 28, 2019 Subject-Specific Criteria of Technical Committee 12 – Mathematics as of December 9, 2016 Subject-Specific Criteria of Technical Committee 13 – Physics as of March 20, 2020 ASIIN Additional Criteria for Structured Doctoral Programmes as of March 15, 2021

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
Master Program of Mathematics Education	M.Pd/M.Ed (Master Pendidikan/Master of Education)	-	7	Full time	-	4 Semester	46 CP / 103.04 ECTS	1992 /annually
Doctoral Program of Mathematics Education	Dr/Dr (Doktor Pendidikan/Doctor of Education)	-	8	Full time	-	6 Semester	48 CP / 120.96 ECTS	1999 / annually
Master Program of Science Education	M.Pd/M.Ed (Master Pendidikan/Master of Education)	-	7	Full time	-	4 Semester	45 CP / 100.80 ECTS	2006 / annually
Doctoral Program of Science Education	Dr/Dr (Doktor Pendidikan/Doctor of Education)	-	8	Full time	-	6 Semester	47 CP / 118.44 ECTS	2010 /annually

The State University of Surabaya (Universitas Negeri Surabaya, UNESA) is a public university located in Surabaya in the northeast coastal region of Indonesia's main island Java. Originally founded as an Institute of Teacher Training and Education in 1950, it remained a center for teacher education until 1999, when UNESA was established as a university by governmental degree. UNESA received an extended mandate allowing offering study programs in education while additionally offering non-education programs. Currently it is divided into faculties: (1) Faculty of Education, (2) Faculty of Languages and Arts, (3) Faculty of Mathematics and Natural Sciences, (4) Faculty of Social Sciences and Law, (5) Faculty of Engineering, (6) Faculty of Sport Science and (7) Faculty of Economics.

The number of students at UNESA was constantly rising during the last years with the highest numbers in the Faculty of Engineering, the Faculty of Languages and Arts and the Faculty of Social Sciences and Law. In 2022, UNESA had 29,029 enrolled undergraduate, graduate and doctoral students, but numbers are surpassing 30,000 in 2023. The number of graduate and doctoral students remains low at 1648. The teaching staff is also increasing during the last years, reaching a total number of 1048 in 2022 (overall teacher to student ratio is 1:28). The staff comprises 180 lecturers, 204 assistant professors ("asisten ahli"), 343 assistant professors ("lektor"), 247 associate professors ("lektor kepala"), and 74 full

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

professors. All academic staff at UNESA engages in education, research and community service (the Tridharma (three pillars) of higher education in Indonesia). UNESA has issued a strategy and roadmap in 2020 to increase the quality and quantity of its research output. The strategy includes fostering UNESA's research culture as well as multidisciplinary research activities on a national and international level. Thus, UNESA expects to fulfill its vision to be excellent in education and strong in science. UNESA's strategic plan considers a long-term development master plan for 2011–2035 divided into five-year steps. After successfully implementing international study programs at each department during the last years, UNESA focuses now in improving its reputation and therefore searches for international accreditation. During the years 2024 – 2029, UNESA further plans to become a recognized national research university. To reach this goal, UNESA has defined the following mission and goals on its webpage.

Mission:

1. "To conduct education and learning centred on students by using effective instructional approaches, and optimizing the use of technology
2. To conduct researches in educational sciences, natural sciences, social and cultural sciences, arts, and/or sports, and developments of technologies whose findings are beneficial for the development of sciences and public welfares
3. To disseminate science, technology, arts, culture and sports, and research results through community service oriented towards empowering and civilizing society
4. To realize Unesa an educational centre, especially for primary and secondary educations as well as a scientific center based on the noble values of national culture
5. To conduct an autonomous, accountable, and transparent high educational governance for a sustainable quality assurance and improvement."

Goals:

1. "Graduate an intelligent, religious, noble, independent, professional and excellent student;
2. Produce excellent scientific and creative works in education and science as well as become a reference in both science and/or technology application;
3. Engage in community service through science and/or technology application to create an independent, productive, and prosperous society;
4. Make the Universitas Negeri Surabaya as education and science centre carrying the noble values of national culture; and

5. Produce effective and efficient institutional performance by creating a humanistic academic climate as well as a transparent, accountable, responsive, and just institutional management to ensure the implementation quality of the tri-dharma of higher education sustainably."

UNESA's motto is "Growing with character" which it aims to achieve through faith, intelligence, intendance, honesty, caring and firmness. UNESA further received institutional accreditation as "excellent" by the National Accreditation Board of Higher Education. According to the Times Higher Education Ranking, UNESA is listed 19th in Indonesia, 103rd in Southeast Asia and among the best 650-700 in Asia.

The four study programs under review are based at the Faculty of Mathematics and Natural Sciences (FMIPA) and they associated with the Department of Mathematics Education and the Department of Science Education.

UNESA describes on its webpage that the master program *Mathematics Education* (MPME) was established in 1981/1982 with the support of the national and international universities as the first postgraduate program at UNESA. At the beginning, teaching was shared between the Institute of Technology Bandung and UNESA with a clear focus to combine mathematics and pedagogy. The study program has issued the following vision on its webpage: "In 2027, it will become one of the best centers for master programs in Mathematics Education in Indonesia and have a good reputation at the international level with a main focus on studying students' cognitive processes in solving mathematical tasks."

The doctoral program *Mathematics Education* (DPME) was established as one of the first PhD programs at UNESA in 1999. UNESA defines the following vision on its webpage: "The Doctoral Program of Mathematics Education (DPME) at Post Graduate FMIPA Unesa aims to produce graduates who can become Senior Academician of Mathematics Education, Researcher in Mathematics Education, Developer and Consultant of Mathematics Education who have the following objectives."

For the master program *Science Education* (MPSE), UNESA describes that the program was established to meet the needs of educations and educational practitioners in science at the level of primary education, secondary education, and college. The study program aims to create graduates, who are able to become academics, practitioners, and researchers in the field of science education. UNESA states that the focus of the program is to integrate the

needs of the 21st century, namely creative thinking, critical thinking, problem solving, communication and collaboration. The master program *Science Education* emphasizes in research and learning on the development of science literacy. The study program's vision is defined on the webpage as: "In 2030, it will become a provider of Science Education excellent at the ASEAN level based on learning innovation and scientific development in the field of science education."

On the webpage of the doctoral program *Science Education* (DPSE), UNESA specifies that the academic activities of the program are continuously developed. Graduates are working mainly as educators, research managers and researchers in the field of *Science Education*. UNESA has published the following vision online for this PhD program: "In 2025 it will become a *Science Education* doctoral study program that is "Excellent in innovation and development of national culture-based science education."

C Expert Report for the ASIIN Seal[4]

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
- Academic guidelines for master programs
- Academic guideline for doctoral programs
- Diploma supplement
- Webpage UNESA https://en.unesa.ac.id/
- Webpage master Mathematics Education https://s2pendmatematika.fmipa.unesa.ac.id/
- Webpage PhD Mathematics Education https://s3pendmatematika.fmipa.unesa.ac.id/
- Webpage master Science Education https://s2pendsains.fmipa.unesa.ac.id/
- Webpage PhD Science Education https://s3pendsains.fmipa.unesa.ac.id/
- Discussion during the audit

Preliminary assessment and analysis of the experts:

UNESA informs the experts that the master and doctoral programs *Mathematics Education* and *Science Education* are based at the Faculty of Mathematics and Natural Sciences (FMIPA), which combines study programs in science and education. UNESA describes that lectures of the science and education programs are involved in managing the study programs, strengthening the scientific expertise of the education programs. According to the self-assessment report, the responsible people for a study program develop the Program

[4] This part of the report applies also for the assessment for the European subject-specific labels. After the conclusion of the procedure, the stated requirements and/or recommendations and the deadlines are equally valid for the ASIIN seal as well as for the sought subject-specific label.

Learning Objectives (PEOs) and the Program Learning Outcomes (PLOs) referring to the vision, mission, and objectives of UNESA and FMIPA. Additional national agenda are further incorporated such as the Indonesian Qualification Framework and the National Higher Education Standards. Additionally, the study programs in *Mathematics Education* follow the Mathematical Education Postgraduate Association, whereas programs in *Science Education* recognize the guidelines of the Association of Indonesian Science Educators and the Indonesian Science Education Postgraduate Association. UNESA describes that the qualification of the study program graduates is determined considering self-evaluations, tracer studies and market needs. Input from various stakeholders, for example alumni, students, and professional associations, are integrated. UNESA explain that their curriculum follow the demands of 21st century skills, suggested by educators, business leaders, academics, and government agencies. According to the self-assessment report, the study programs under review are improved every five years. This includes development of competency profiles through curriculum and graduate profile redesign. UNESA follows the principal foundation in accordance with development of outcome-based curricula (OBC) as well as the implementation of outcome-based education (OBE).

UNESA lists in its self-assessment report that the PEOs of the master program *Mathematics Education* (MPME) are defined as:

1. Able to use their knowledge and skills to solve mathematics education problems with an inter- and multidisciplinary approach.
2. Develop themselves through further studies, research, and professional activities both at national and international levels.
3. Have professional and ethical responsibilities in carrying out their duties and works.

UNESA describes to the experts that a curriculum team receives the task to define PLOs on the basis of the PEOs. This team considers various sources describes above in the PLO development. UNESA defines the following PLOs in its self-assessment report:

Aspect	PLO	Code
Knowledge	1. Able to demonstrate mathematics knowledge and understanding	KNO-1
	2. Able to demonstrate mathematics pedagogical content knowledge and understanding	KNO-2

	3. Able to demonstrate knowledge and under-standing of mathematics education research	KNO-3
Skill	4. Able to use mathematical ideas to solve mathematics problems	SKI-1
	5. Able to design, implement, and evaluate an effective and innovative mathematics instruction	SKI-2
	6. Able to design, implement, and critically evaluate con-temporary mathematics education research	SKI-3
Competency	7. Able to work on and present problems in mathematics and mathematics education	COM-1
	8. Able to work independently on a complex problem in mathematics and mathematics education, present and scientifically discuss the results both orally and in writing	COM-2
Attitude and Social	9. Collaborate and be responsible professionally and ethically in completing mathematics and mathematics education tasks	SOC-1

UNESA presents in its self-assessment a matrix, which illustrates how the PLOs correlate with the PEOs. In addition, the show the reference of the PLOs to the requirements of the Indonesian Qualification Framework as well as the ASIIN Subject Specific Criteria (SSCs).

Based on the PLOs, UNESA consider the listed qualifications allow graduates of the program *MPME* to work as educators, researchers and practitioners.

UNESA defines in its self-assessment report the following PEOs for the doctoral program *Mathematics Education* (DPME):

1. Able to develop knowledge of mathematics education that is related to technol-ogy and professional practice creatively.
2. Able to solve mathematics education problems by using transdisciplinary ap-proach in national and international level.
3. Having professional responsibility and academic ethics to manage the given task.

Inside the self-assessment report, UNESA illustrates the following PLOs for DPME:

Aspect	PLO	Code

Knowledge	1. Able to master the paradigm of thinking in the philosophy of mathematics and education mathematics, the relationship between the two in science, and concepts cognitive psychology, as well as other concepts developed to solve problems mathematics education.	KNO-1
	2. Able to master advanced mathematical concepts.	KNO-2
	3. Able to master the theory and research related to pedagogical principles in mathematics education that is original, creative, and innovative through research.	KNO-3
Skill	4. Able to find new scientific ideas in mathematics education through interdisciplinary, multidisciplinary, or trans-disciplinary approaches.	SKI-1
	5. Able to solve educational problem through integrative studies in life, culture, pedagogy, mathematics, and technology, and information.	SKI-2
	6. Able to carry out research and development of mathematics education beneficial to the public interest.	SKI-3
Competency	7. Able to make decision based on data and communicate research ideas, results and its argumentation written and oral.	COM-1
Attitude and Social	8. Able to demonstrate national culture values as well as ethics academics in carrying out their professional duties.	SOC-1
	9. Able to demonstrate scientific, critical, creative, and innovative attitude in developing mathematics education.	SOC-2

UNESA determines that the study program DPME is divided into the three major groups such as pedagogy, mathematics, and social attitudes. The pedagogic studies combine mathematics teaching and learning, mathematics education research, and mathematics education theories. In addition, mathematics studies consist of foundations, analysis, algebra, geometry, combinatorics and computation, applied mathematics, and statistics. These are completed by social attitudes consist of personality development and entrepreneurship.

According to the collected data, UNESA states that graduates from the program DPME find occupation as mathematics education senior academics, expert researchers, and expert consultants and developers.

The master program Science Education (MPSE) aims to produce graduates with the following characteristics outlined in the defined PEOs:

1. Able to manage and develop science educational research to solve science educational problem through multi and interdisciplinary approaches.
2. Able to develop TPACK (Technology, Pedagogy, Content Knowledge)-based on science learning materials.
3. Able to build mutually beneficial cooperation networks in science education in local, national, and international scope.
4. As an individual who has a professional ethics and character.
5. Able to develop themselves continuously and sustainably through education, training, and/or other self-development activities both formal and informal.

UNESA lists the following PLOs for the program MPSE based on the PEOs above.

Aspect	PLO	Code
Knowledge	1. Mastering the philosophy of science education as a basis for thinking in developing superior innovations in science education.	KNO-1
	2. Mastering knowledge and technology in science education supported by the latest IT.	KNO-2
	3. Mastering the theory of pedagogy and andragogy science education and able to package science learning through the TPACK (Technological, Pedagogical, and Content Knowledge) framework.	KNO-3
Skill	4. Able to develop logical, critical, systematic, and creative thinking in the field of science through scientific studies and compiling scientific conceptions and studies based on scientific principles, procedures, and ethics in the form of a thesis.	SKI-1

	5. Able to solve science education problems with a multi and interdisciplinary approach through development research methodologies based on current issues.	SKI-2
	6. Manage, develop, and maintain network to improve self-capacity in local, national, and international scope.	SKI-3
Competency	7. Design, implement, and evaluate the science education curriculum to develop more effective learning innovations.	COM-1
	8. Design and develop innovative learning materials (lesson plan, teaching materials, student work sheet, media, and/or assessment instruments) to solve learning problems and improve the quality of scientific learning.	COM-2
	9. Designing and creating a conducive scientific learning environment to carry out active learning and reflecting to determine its effectiveness.	COM-3
Attitude and Social	10. Have honest, independent, caring, tough, and leadership-minded attitude/character	SOC-1
	11. Have the ability to develop themselves continuously.	SOC-2

The experts approve UNESA description how the PEOs and PLOs correlate with the Indonesian Qualification Framework on the ASIIN SCCs in the related subjects.

UNESA describes in its self-assessment report that graduates from the program MPSE fit the profile to become educators, researchers, and education consultants.

According to its self-assessment report, UNESA has issued the following PEOs for the doctoral program *Science Education* (DPSE):

1. Able to collaborate and apply professional ethics in carrying out their duties and work.
2. Able to develop themselves in a sustainable manner, as well as being a reference for related professions.
3. Able to develop knowledge for problem solving in the field of science education in an inter-disciplinary, multidisciplinary, and transdisciplinary manner and support career development.

4. Able to carry out publications as a means of scientific communication both orally and in writing in professional activities at the national and international levels.

To define the PLOs of the program DPSE, UNESA considers the PEOs, intended graduate profile and analysis of the tracer studies. On this basis, it issued the following PLOs:

Aspect	PLO	Code
Knowledge	1. Able to master the philosophy of science education to develop and update the science education.	KNO-1
	2. Able to master the latest theories related to science knowledge and science education.	KNO-2
Skill	3. Able to develop theories or methods in the field of science education and their linkages with theories in other fields comprehensively and contextually, through innovative research with interdisciplinary, multidisciplinary, or transdisciplinary approaches that have national or international recognition.	SKI-1
	4. Able to solve science education problems in a wider context so as to produce creative, original, tested works that are beneficial for the development of science education and the benefit of mankind.	SKI-2
Competency	5. Able to lead and manage interdisciplinary, multidisciplinary and transdisciplinary research to produce innovation and development of science education.	COM-1
	6. Able to compose scientific arguments and solutions based on a critical view of facts, concepts, principles, or theories that can be scientifically and ethically justified, and communicate them through scientific publications in reputable international journals.	COM-2
Attitude and Social	7. Internalizing scientific attitudes and behavior to contribute to improving the quality of life.	SOC-1
	8. Collaborate and apply professional ethics in carrying out their professional duties.	SOC-2

According to the self-assessment report, UNESA is convinced that the PLOs support the achievement of the Indonesian Qualification Framework of the DPSE. UNESA describes further that it aims to "producing graduates who have a strong ability to understand and master science education and issues related to science education. This capability enables graduates to become professionals who take on the main roles of educators, researchers, and innovators in science education who can compete nationally and globally."

The experts learn that graduates from the master and doctoral program are entitled to teach at junior and senior high schools as well as at universities. According to the tracer studies, graduates from the programs MPME and MPSE mainly work as teachers in the education section. The majority of them has already experience in teacher from previous jobs but want to continue their education in a master program. The teaching staff adds that it is uncommon in Indonesia to directly change from a bachelor program in education to a master program. Most students move from the bachelor program to complete their Pre-Service Teacher Professional Education or PPG. This one-year program is mandatory for everyone, who wants to be employed at a public school in Indonesia although exceptions occur with private schools. Therefore, the majority of the students in the program MPME and MPSE bring a high amount of practical teaching experience when they enroll in these programs. The experts welcome this explanation and consider it when evaluating the study programs under review.

The experts ask the program coordinators to specify on the characteristics of the doctoral programs. They explain that the DPME focuses on knowledge based on cognitive processing. They add that each doctoral programs in Indonesia needs to define a focus, although this only guides the research activities and doctoral thesis.

In the discussion with the experts, the industry partner state that they are satisfied with the qualifications of the students and graduates from the study programs. Several partners report that they have employed graduates from UNESA, who have strong qualifications in teaching, education as well as skills to manage schools. Several graduates from the programs under review have reached high positions in schools in Surabaya and beyond. This involves further graduates who work inside a curriculum development program, which is designed specifically for headmasters at school. Other industry partners from universities mention that their colleagues have graduated from the study programs under review. They have high competences in knowledge and practical work. The students and alumni also show high satisfaction with their education they receive(d) at UNESA.

In the discussion, the representatives of the rector's office give more details on how UNESA verifies if the objectives of the study programs are reached. On one hand, UNESA conducts tracer studies to collect data and opinions of alumni. Based on these results, UNESA reviews

the study program's vision and potentially make adjustments of the PEOs and PLOs. Overall, the representatives of the rector's office confirm in the discussion with the experts that UNESA considers the input from stakeholders, including students, alumni and users, when reviewing their study programs. During this process, UNESA also considers the market needs, which refers to the job markets matching the qualifications of the graduates.

In conclusion, the experts consider the PEOs and PLOs of the programs MPME, DPME, MPSE, and DPSE as well described and concisely. They confirm that these are transparently published in the diploma supplements and UNESA's webpage. Therefore, they are available to students, lecturers and interested third parties. The experts consider that the PEOs and PLOs reflect the targeted academic qualification level of each study program including the European Qualifications Framework. Furthermore, the study programs are consistent with the ASIIN SCCs as well as the ASIIN criteria for study programs and structured doctoral programs. In the opinion of the experts, the PEOs and PLOs are relevant to the labor market and the needs to the society. In spite of the positive feedback from the stakeholders during the on-site visit, the experts recommend to diversify the stakeholders. All stakeholders in the discussion belong to universities and schools; the experts acknowledge that all programs under review are concerning education; nevertheless, stakeholders from organizations, agencies and companies could give meaningful feedback to improve the study programs as well. The experts therefore recommend inviting stakeholders from various background in the future.

Criterion 1.2 Name of the Degree Programme

Evidence:

- Self-assessment report
- Diploma and diploma supplement
- Webpage master Mathematics Education https://s2pendmatematika.fmipa.unesa.ac.id/
- Webpage PhD Mathematics Education https://s3pendmatematika.fmipa.unesa.ac.id/
- Webpage master Science Education https://s2pendsains.fmipa.unesa.ac.id/
- Webpage PhD Science Education https://s3pendsains.fmipa.unesa.ac.id/
- Webpage FMIPA https://fmipa.unesa.ac.id/

Preliminary assessment and analysis of the experts:
The experts learn that the names of the study programs under review are in accordance with the regulations of the Indonesian Ministry of Research, Technology and Higher Education. In the programs MPME and MPSE, UNESA awards a Master of Education (Magister Pendidikan or M.Pd.). Graduates from the programs DPME and DPSE receive the title of Doctor (Doktor or Dr.).

The experts consider that the title of the study programs under review reflects the PEOs and PLOs as well as the teaching and learning content. The names follow international terminology and are therefore well understood in their respective field. The experts observe that the names are consistently used in all submitted documents and the online presentation. An exception is the webpage of FMIPA, which only offers an automatic translation. On this page, the study programs Science Education result in a translation of "Natural Science Education." The experts comment that all translations should be consistent and recommend offering an alternative webpage fully established in English.

Criterion 1.3 Curriculum

Evidence:

- Self-assessment report
- Academic guidelines for master programs
- Academic guidelines for doctoral programs
- Module handbook of each study program
- Statistical data on student mobility
- Webpage master Mathematics Education https://s2pendmatematika.fmipa.unesa.ac.id/
- Webpage PhD Mathematics Education https://s3pendmatematika.fmipa.unesa.ac.id/
- Webpage master Science Education https://s2pendsains.fmipa.unesa.ac.id/
- Webpage PhD Science Education https://s3pendsains.fmipa.unesa.ac.id/
- Discussion during the audit

Preliminary assessment and analysis of the experts:
<u>Content & Structure</u>

UNESA describes in their documentation that its study programs are designed following the Indonesian Qualification Framework, the Higher Education National Standards as well as the mission and vision of UNESA and FMIPA. All curricula were restructured in 2018 implementing outcome-based education. Moreover, UNESA aimed to put a stronger focus on topics regarding sustainable developments and fostering 21st skills such as communication, critical thinking and problem solving skill, and innovation.

The study program *MPME* consists of 46 credit units (CU), which should be completed within four semesters studying full time. The majority of courses are compulsory (42 CU) whereas 4 CU are dedicated to electives. The students can choose two out of nine elective courses offered. The curriculum contains a mandatory internship (module "Field study"; 2 CU). The fourth semesters considers only the modules "Publication" (2 CU) and "Thesis" (6 CU). UNESA illustrate the curriculum as follows in its self-assessment report:

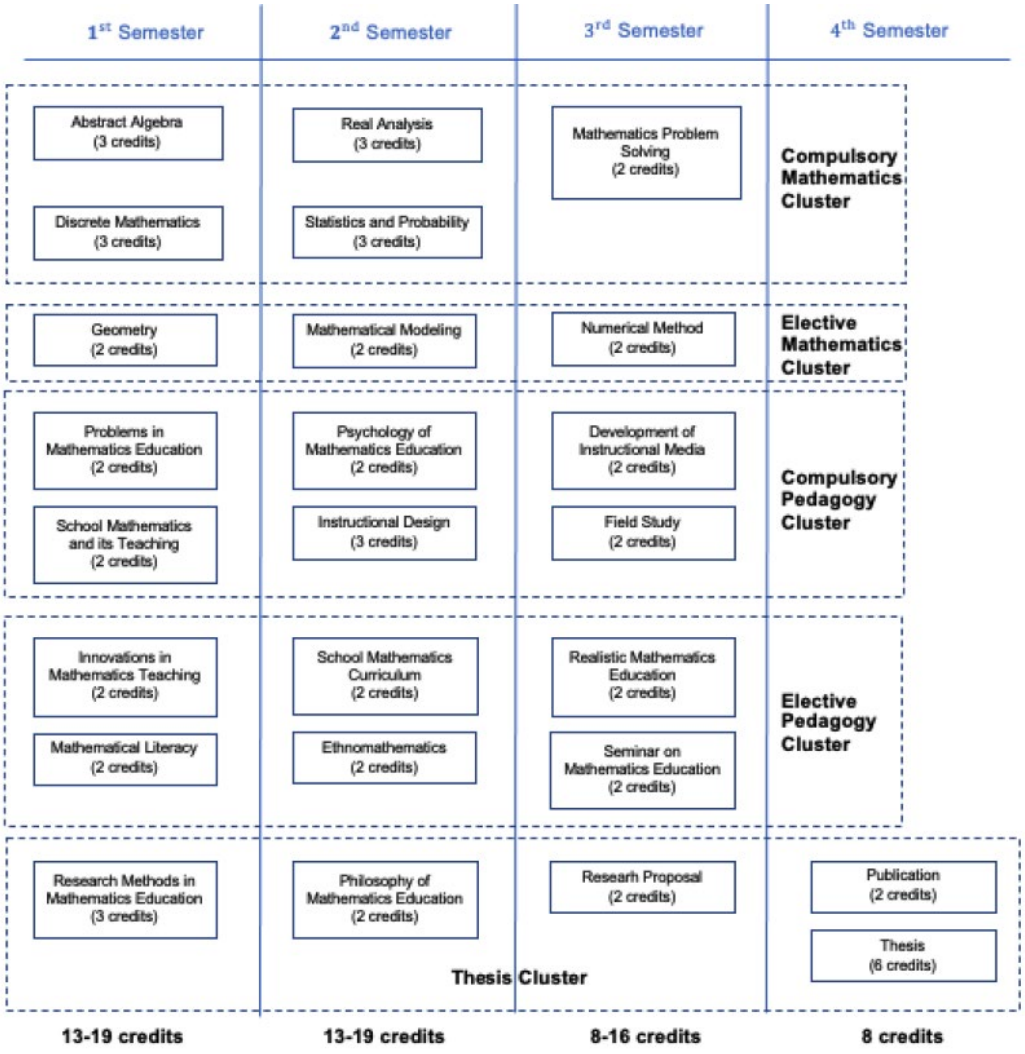


Figure 1. Curriculum overview of MPME *(source: self-assessment report).*

UNESA explains in its self-assessment report that the curriculum of *DPME* has 48 CU, divided in 40 CU compulsory courses and 8 CU electives (11 offered courses). The attempt study duration is six semesters or three academic years. In the first year, students have to attend courses to strengthen their scientific basis and philosophy. Starting from the second year, students carry out their research and work on their dissertation. The third year of the curriculum is dedicated to the modules "Publication" (5 CU) and "Dissertation" (9 CU).

UNESA provides the following illustration on the curriculum of *DPME*:

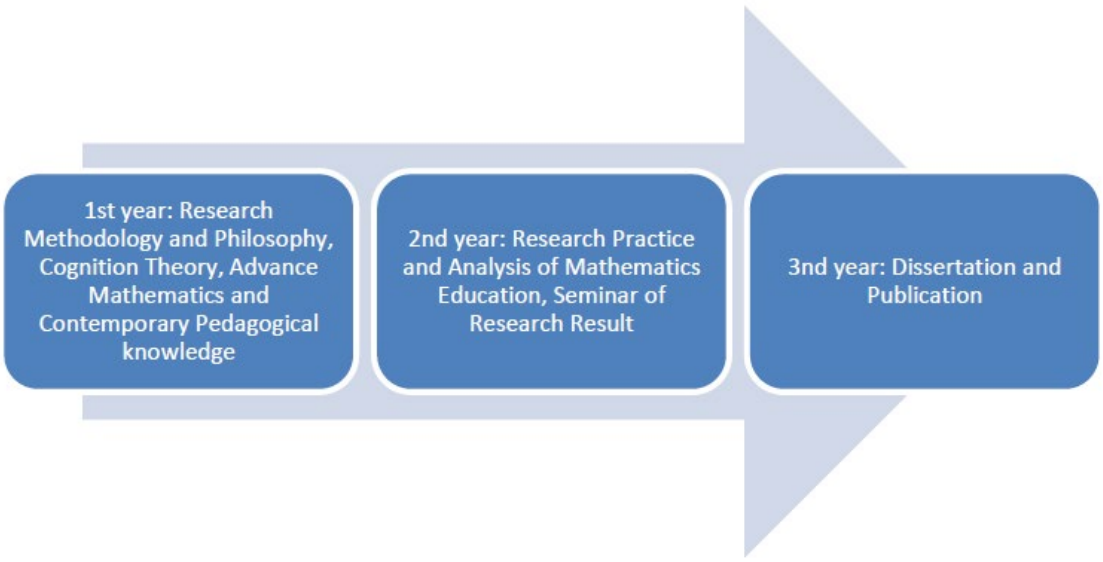


Figure 2. Model curriculum structure of DPME *(source: self-assessment report).*

The study program aims to prepare graduates to become experts as educators, researchers, and innovators in the field of mathematical education. Moreover, graduates should be capable of working in interdisciplinary, multidisciplinary, or transdisciplinary projects.

As described in the self-assessment report, the program *MPSE* comprises 45 CUs of which 43 CU are compulsory and 2 CU are electives. Four elective courses are offered to the students. Students need to take part in the module "Internship" (3 CU). The study program further requires the students to complete the module "Thesis" (6 CU) and "Publication" (2 CU). The curriculum is designed to prepare students to strengthen their background in science, science philosophy and their research skills. Courses are considered to complement each other and build on the students' knowledge in physics, biology, chemistry and science education.

The curriculum is organized in the following stages as illustrated below:

Figure 3. Curriculum steps of the programs MPSE (source: self-assessment report).

UNESA states that the curriculum of ***DPSE*** was developed considering the guidelines of the Indonesian Science Educators Association. The curriculum structure has been revised in 2021 with ongoing adjustments until 2026 following suggestions by students, alumni and other stakeholders. The study program is designed to be completed in three academic years or six semesters. The curriculum has in total 47 CU, divided into 41 CU for compulsory courses and 6 CU to elective courses (six courses are offered). The content of the curriculum aims to strengthen the students' knowledge in scientific philosophy of science education and research methods. UNESA emphasizes that research development and research implementations are central pillars of the study program to guide the students towards finishing their dissertation. The fifth semester contains the mandatory module "Publication" (5 CU), whereas the six semester contains the module "Dissertation" (9 CU). During the first year, students are required to complete their courses before they engage in their research activities starting from the third semester. The structure of the curriculum is presented as follows:

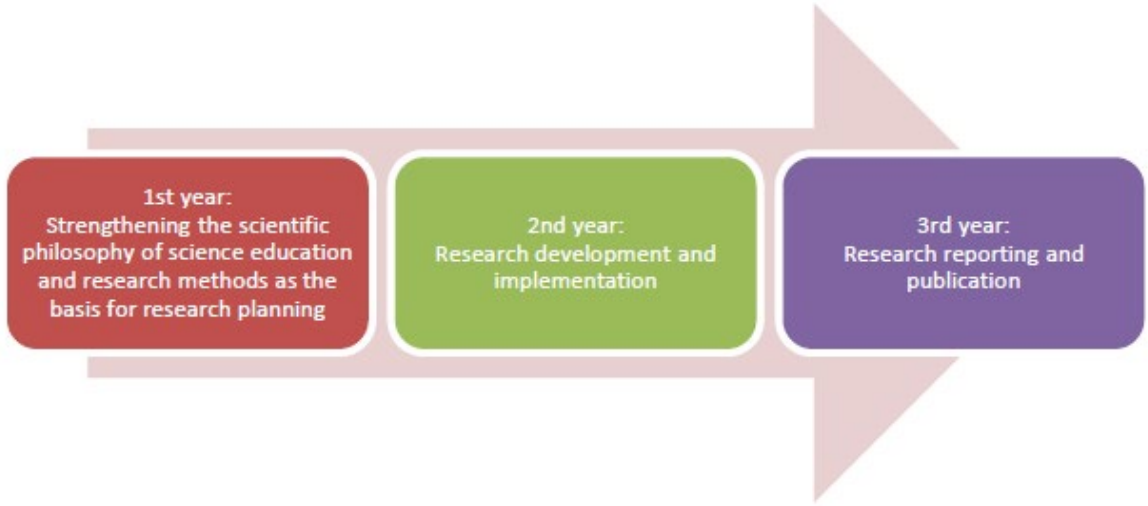


Figure 4. Overview of the topics of the curriculum in DPSE (source: self-assessment report).

During the on-site visit, the program coordinators explain to the experts that the master and doctoral study programs *Mathematics Education* and *Science Education* are associated with FMIPA. This allows them to give joint lectures on the topics of education and science. All lecturers of FMIPA can get involved in teaching.

The experts are interested in the low number of credits dedicated to elective courses, especially in *MPSE* (4%) whereas in *MPME* it reaches 16%. The program coordinator mention that electives in MPSE only support the content of a single subject. In contrast, they aim to focus on the three disciplines and integrative topics, which requires the students to take more courses. In the future, UNESA plans to create new electives courses and increase the number of credits assigned to those.

The experts learn that students in the doctoral study programs *DPSE* und *DPME* have to take courses in the first year of their studies. After completion, they move on to their research in the PhD project. The doctoral students state that they have an academic advisor, who supports them in the second semester to prepare for their research proposal. This proposal has to be defended in front of a panel in order to proceed with their studies. The students consider the set of courses suitable for their studies as it prepares them to for their dissertation and their work later at schools and universities. However, the experts consider the high number of courses not suitable for a PhD program. The program coordinators explain that the structure of the doctoral program *DPME* was changed in the last decade to include less and less courses. Several courses such as pure mathematics were changed to elective courses. The program coordinators add that they decided to keep courses in complex mathematics as electives since some students miss those from their previous education. Nevertheless, the experts consider the total number of 40 Indonesian credit points a significant workload next to doing research and writing a doctoral thesis. The program coordinators admit that the number of courses is high, but they state that they have never received any complaints or negative feedback on their program structure. These courses are organized using project-based learning to prepare the students for their doctoral thesis. The experts appreciate this explanation but add that courses in scientific writing and how to publish articles might be more beneficial for the students. The experts acknowledge the National Standards for Higher Education require students to take at least 42 CU in their study programs, which is in line with *DPME* and *DPSE*. However, the experts recommend considering to redesign the compulsory courses to focus stronger on supporting research activities, writing publications and their thesis. Additional topics to deepen their scientific expertise should still be available as electives. For example, the experts mention modules like “Advanced Geometry Analysis” or “Mathematical Modelling”, which they consider non-suitable for a PhD program in Mathematics Education since these qualifications should have been acquired in the master studies. In the opinion of the experts, such

missing competences should be competed in electives and not considered in a mandatory module.

The experts are especially interested in the content of the module “Seminar of Research Results” (DPME) and “Seminar of Research Product” (DPSE) awarding five Indonesian credits. The program coordinators describe that students need to present their research results at international conferences and in front of three lecturers from the UNESA. Because this seminar is divided into two events, the students receive a higher number of credit points than at a usual seminar. They add that students can attend international conferences in Indonesia, but receive higher grades when travelling abroad.

The experts discuss the curriculum also with the students; they consider that UNESA has implemented a modern curriculum in the study programs. It includes learning innovative science concepts including hot topics of modern science. In the programs in *Science Education*, this includes also learning on integrated science concepts, such as in the module “Integrated Science Education” (MPSE).

Based on the submitted documentation, the experts have trouble understanding the internships in the study programs under review. The module handbook does not provide sufficient information on the internships (see criterion 4.1) in *MPSE* and *MPME*. The program coordinators specify that internships are compulsory in both master programs (“Field work” in *MPME* and “Internship” in *MPSE*), but not in the doctoral programs. Students spend their internships at schools or universities, where they engage in different tasks. The internship is mainly divided into three aspects (1) teaching, (2) research, and (3) workshop. Students in teaching part are required to design and implement a lesson plan. Students are guided by their host organizations. In collaboration, they will analyze and reflect on the lesson plan. In addition, the students engage in research activities together with their supervisor(s). The students further need to develop a workshop, which will be organized at their host institution. The experts approve this explanation but add that the number of awarded credits for the internships appears low in comparison to the importance of their work and the low number of pedagogy in other courses. The program coordinators admit that the internship is central in the master programs. They add that they want to increase the number of credit points of the internship with a new curriculum in the future. The partners from the industry add that the master students usually receive research problems they should work on during their internships. The students should analyze teaching and learning problems and find solutions. The students often integrate their internship experiences into their final thesis and/or publications. They highlight that the internship is part of their curriculum and they receive credits. Students from the *MPSE* confirm that there are various opportunities for teaching and research collaborations. The teaching staff specifies that

during their internship, students combine their theoretical and practical skills. Students often conduct their internship in school, where alumni work with whom they have ongoing collaborations. This situation facilitates the research conducted during the internship and might potentially support the students with funding. The teaching staff considers the internship the best opportunity for students to collect data for their final project. The experts appreciate the integrated internships; nevertheless, the experts considers that the amount of credits is too low considering the various tasks the students need to engage at school. They strongly recommend increasing the numbers of credits to support the students in collecting research data and experience during their internships.

The experts further inquire how students in *MPME* and *DPME* engage with technology, for example in Computer Algebra Systems or Geometric Systems (e.g. Geogebra). The program coordinators state that students are not directly involved in technology in any of their courses. However, technology commonly is a topic of their thesis. The students describe to the experts that they use several software and technology in their thesis. These range from statistical analysis with SPSS or similar to analyze their data to virtual and augmented reality as well as artificial intelligence. Students further state that they are familiar with Geogebra. This resulted in a research project, where they analyzed how students solve problems using this tool.

Discussing research in the master and doctoral programs, the experts acknowledge that it is common that students publish their research in collaboration with their supervisors(s). The experts observe that alone in the year 2020–2021, 31 theses were produced; according to the program coordinators, UNESA encourages all students to publish during their master and doctoral studies. Thus, students were involved in 37 scientific publications in the same year, including works in national and international journals. The students support this statement. Several students also report that they received a scholarship, which allowed them to continue their research from a previous degree. The students confirm to the experts that they receive an introduction to scientific writing and research methods; on master level, each student needs to participate in one course on research work, where they also get an introduction to working on publications. The students emphasize that students are required to publish within the master and doctoral programs. Moreover, they plan their research activities together with their supervisor(s). These discussions also include strategies to publish their research. The master students remind the experts that they have a smaller research project to prepare their work in their master project. The students also explain that research collaborations take place between the master and the doctoral students. According to the students, research at UNESA is commonly organized within umbrella projects and/or external collaborations. Topics of umbrella projects are for example

philosophy in ethnoscience, assessment in e-learning and innovation in e-learning. The students mention that they are also able to join research groups outside their core topics, such as research in social science, if they consider it beneficial for their research. Several students report on their involvement in research project and article writing to the experts. They learn that several students are already active in scientific work since their bachelor studies, leading to several research publications during their studies. The majority of doctoral students mention that they have published at least two manuscripts during their PhD studies. Depending on the topic, they decide if the conclusion is suitable for an international or national journal. The experts highlight the involvement of students in research as very positive. Nevertheless, they support the students as they miss scholarships or funding for their research. Students, who received scholarships, mention to the experts that simplified their research activities, especially writing their thesis and research publications. Nevertheless, the students state that all students manage to publish at least one research paper regardless of their funding status. The experts acknowledge these problems but add that they give important information on scholarships to their students. The experts identify here a serious problem. Although they acknowledge that the study program does allow the students to finish in time, they notice that missing funding and scholarships are a major challenge for the students. To facilitate this, the experts suggest increasing UNESA's support for the students. On one hand, this could involve increased funding options presented by UNESA. On the other hand, this could include support of the students to receive external funding, e.g. governmental scholarships. The experts imagine workshops in proposal writing could help the students to receive funding. Alternatively, an early close collaboration between the supervisors and students could provide additional support in writing proposals for scholarships. The experts are convinced that this would not only easy the students' work pressure, but also result in increased quality and quantity of research output.

The partners from the industry show a high satisfaction with the qualifications of students and graduates in the master and doctoral program *Mathematics Education* and *Science Education*. They highlight in particular their teaching skills as well as their patience in teaching students with special needs. However, they also criticize the English proficiency. This applies to students involved in international schools on one side, but also concerns graduates who seek employment as teachers at universities and conduct research. The partners suggest that the curriculum needs to be improved giving the students more experience to speak and write in English. In their opinion, they consider the English proficiency of the average graduates of UNESA not suitable for an international work environment, especially in academia. Thus, they suggest joint supervision with international partners would greatly benefit the English skills, especially of doctoral students. The experts approve this suggestion; they consider it is important to expand the international connections of UNESA and

improve their international research collaborations concerning final thesis and doctoral thesis. Furthermore, the experts consider it essential to include more English into the curricula. Although lecturers often include English slides and reading materials, there are no full lectures organized in English. The experts suggest organizing lectures fully in English to practice writing and speaking English regularly, especially within the doctoral programs.

Although the industry partners confirm a high satisfaction of the curricula of the study programs to the experts, they raise the topics of curriculum and curriculum development. In the discussion, they mention to the experts that master students learn how to develop a curriculum; however, they never learn how to work with curricula in higher education. According to them, graduates from the master program often find jobs at universities; therefore, a basic knowledge of the curriculum in university level would be important. Moreover, they suggest the students could improve their communication skills, especially to parents and stakeholders. Since teachers frequently have contact with these people, they consider it important to receive a basic introduction into such communication. Additional soft skills the graduates should improve according to the industry partners are concerning management skills. Graduates from the master and doctoral programs are increasingly involved in management activities inside schools. Therefore, they regard fundamental knowledge in education management as an important addition to the curricula.

The experts conclude that in their opinion, the presented curricula enable the students to achieve the intended learning outcomes. In the module handbooks, UNESA has defined course learning outcomes for each module, which allow the students to reach the overarching programme objectives. The experts appreciate that internship are integrated in the programs MPME and MPSE to support the students to get experience outside the campus and collect research data. The experts see evidence that UNESA supports the students in finding internships. The experts observe that the entire curricula of the study programs under review awards credit points. Each module represents a well-matched unit of teaching and learning, which contributes to the knowledge, skills and competences the students. The experts consider the order of the module as suitable and confirm that the studies can be completed within the defined study periods. However, the experts consider it important to support the students in receiving external funding to conduct their research. The experts highlight that scholarships and research funding is central in master and doctoral studies as it enables the students to produce high quality research and publication and stay within the intended study duration. Furthermore, the experts support reconsidering the structure of the study programs ***DPME*** and ***DPSE*** shifting from scientific courses to courses on research and research dissemination. In addition, the experts raise the importance of improving the students' English proficiency with including a higher amount of English in the classroom.

Student Mobility

According to the submitted documents, UNESA informs its students on programs on student mobility. This includes academic mobility at collaborating universities as well as externally offered grants. UNESA highlights that is has issued regulations to allow the transfer of externally completed credits following the approval of the UNESA study program coordinators. Students receive support by the sub-directorate of International Affairs and the sub-directorate for Domestic Cooperation in finding suitable programs. The submitted data shows that students in *MPME* mainly take part in field study courses outside UNESA within their internship. Students spend time at secondary schools or higher education institutions; additionally students spend internships at research institutions or take part in educational training workshops. Students in the program *DPME* often take part in courses at other universities, participate in trainings or workshops or attend international conferences. While in 2021, 13 students took courses outside UNESA, one participated in a workshop and 20 attended international conferences, four students in the year 2022 took courses at other universities and 12 participated at international meetings. Students in the program MPSE often take part in internships outside UNESA; however, the program coordinators mention that the motivation is still low concerning student mobility. In 2022, two students participated in short courses and international seminars. Within the program *DPSE*, UNESA supports the students in student mobility. Most common forms of outgoing involves students participating in courses at universities outside UNESA, students enrolling in trainings and workshops and students attending international conferences. In 2021, two students took part in workshops while 18 travels to international conferences. The data presented by UNESA shows a clear increase in 2022 with eleven *DPSE* students participated in courses outside UNESA; seven took part in trainings, and seven in international conferences.

The experts observe that the student mobility is generally low, especially in the master programs. The program coordinators explain that students participate at international conferences and seminars. They have already established collaborations with international schools in e.g. Singapore or within Indonesia to increase the mobility. Several students further report that they have spent time abroad, including for example Malaysia and Thailand. They admit to the experts that they have learned much during the time spend outside UNESA and recommend exchange programs to their peers. The students describe that they got experience in teaching and research during they student exchange. Nevertheless, the students emphasize that they miss scholarship opportunities for extended stays abroad (e.g. one semester). The experts notice their strong interest in staying at universities outside Indonesia. The teaching staff adds that they currently do not have opportunities for international grants or fellowships for students at UNESA; grants are only available at gov-

ernmental level. The teaching staff adds that they are currently trying to expand the students' access to courses at international collaboration partners. UNESA is currently developing plans to support its students in taking courses at partners in Thailand and Taiwan. However, they currently still miss funding to support the students in their mobility. They aim to initiate programs allowing students full funding by the faculty. The experts appreciate this strategy and hope to see increasing numbers of outgoing and incoming students in the future. Nevertheless, the experts continue to recommend developing strategies to increase the student mobility, particularly for long-term stay abroad and research collaboration projects.

Upon questioning the number of international students in the programs under review, the experts learn that currently only one students is enrolled. The representatives of the rector's office emphasize that UNESA is currently increasing its effort to recruit a higher number of international students. UNESA started to offer full scholarships to master and doctoral students coming from oversea. This scholarship aims specifically at students from developing countries who search to continue their higher education. Furthermore, UNESA is going to take part in International Study Exhibitions in Malaysia, East Timor, Thailand and other countries to promote its study programs abroad. The representatives of the rector's office confirm to the experts, that UNESA is working on establishing several double degree programs with international partners. These include among others, universities in the United Kingdom, Thailand, Malaysia and the Philippines.

In summary, the experts note that UNESA promotes international student mobility through an appropriate framework. However, the experts support UNESA's program to increase the number of international students within the study programs under review and increase the number of outgoing students. The experts highlight that institutional support to access scholarships is recommendable.

Periodic Review of the Curriculum

According to the self-assessment report, UNESA conducts regular reviews of the curricula of the study programs under review and documents these changes. Last adaptions of the curricula in *MPME* considers major changes in 2017 (structure, objectives, learning outcomes); 2020/2021 followed changes in the allocation of credits to compulsory and electives based on feedback by students. The curriculum development in *DPME* considers implementations annually based on students' questionnaires. Major changes in *DPME* are implemented every five years after an in-depth curriculum review considering students, lecturers, alumni, and other stakeholders such as mathematics education experts and representatives of the Indonesian Mathematics Education Postgraduate Association. UNESA presents documentation on the most recent changes in *DPME* showing a decrease in in credits

in compulsory courses and an increase in electives in 2020, and a reduction of credits dedicated to education courses in 2018 while newly offering courses on mathematics philosophy. Since 2020, UNESA has attempted to strengthen the research component of *DPME* and put a stronger emphasis on mathematics education in relation to mathematics. UNESA states that the curriculum of *MPSE* is updated annually following students' feedback and a curriculum audit. UNESA considers this as a curriculum monitoring which ensures that the curriculum considers recent developments in the field and inside society. This review involves lecturers, science education experts, alumni, stakeholders, and students. A period review of the curriculum also takes place in the program *DPSE* according to the self-assessment report. It takes place every year considering evaluations; larger changes in the curriculum is organized every five years. All collected feedback is considered in these reviews, including students, alumni, lecturers, experts and other stakeholders. Adaptions in 2018 followed several changes concerning the module "Dissertation" as well as content changes in the science education courses increasing the focus on innovation and recent issues in the field. Furthermore, the pool of electives was enlarged and the topics of ICT in science learning was expanded together with the courses on local wisdom.

The experts acknowledge that a period review of the curriculum takes place. During a curriculum audit, the PLOs of all study programs were assessed and analyzed at department and faculty level. In conclusion, the PLOs were reached, but adjustments were decided based on the analysis of their tracer studies. However, the partners from the industry present in the discussion mention to the experts that they were not invited to review the curriculum. One person, who is an UNESA graduate, states that tracer studies are conducted, which contains questions on the curriculum. The experts observe that this situation needs improvement. UNESA needs to conduct systematic surveys at their partners from the private sector and industry to give feedback on the study programs as well as the curricula.

Criterion 1.4 Admission Requirements

Evidence:

- Self-assessment report
- Webpage UNESA admission https://admisi.unesa.ac.id/
- Discussion during the audit

Preliminary assessment and analysis of the experts:

The experts learn from the submitted documents that students need to pass a selection test before being accepted into the master and doctoral programs under review. UNESA presents the following numbers of applicants in its self-assessment report:

Table 1. Overview of the number of applicants vs. the number of admitted students in the last years. (source: self-assessment report)

	2020-2021		2021-2022		2022-2023	
	Applicant	Admitted	Applicant	Admitted	Applicant	Admitted
MPME	29	26	30	19	24	20
DPME	12	7	43	38	10	9
MPSE	32	30	72	42	27	21
DPSE	13	12	7	7	9	9

The representatives of the rector's office explain that this test is computer-based requiring the students to prove their academic ability in related subjects. To take part in this test, the students need to fulfil several requirements. In addition, all students are invited to an interview at UNESA to assess the students' interest, motivation, and English language skills. The access to the four study programs under review is limited; however, the aim is to take in as many qualified students as possible according to representatives of the rector's office. Especially the admission to the programs in *Science Education* are open, allowing students from various backgrounds to enter, such as biology, physics, chemistry and related subjects e.g. agriculture. Nevertheless, admission is only possible for students with a grade point average (GPA) above 3.0 and holding a required degree. The program coordinators add that students from non-educational backgrounds receive suggestions for additional courses to compensate their missing competences in pedagogy. The experts approve that UNESA requires the students to submit a TOEFL test to prove their English competences. The experts note that identical scores are required in master and doctoral programs. The program coordinators consider the situation as acceptable; whereas the experts highlight that students in a PhD program should have significantly better skills in English. They consider that especially the level of research strongly differs in the doctoral programs, especially in a modern and international research environment. In order to ensure that doctoral students have high English competences, UNESA could consider raising the TOEFL scores allowing access only for those, who are fluent in English.

The students inform the experts that they view the admission process as fair and transparent. They had access to the necessary information and could submit their application online. They add that also their interviews were held online during the COVID-19 pandemic.

As mentioned in the discussion with the representatives of the rector's office, UNESA aims to increase the number of its postgraduate students as well as its international students.

The experts approve this strategy and highlight that a higher number of postgraduate students is also beneficial for the research activities at UNESA. In addition, the experts support UNESA's strategy to increase the number of international students. The experts approve to increase UNESA's advertising abroad, but highlight that admission requirements need to be available for all students in English. The internationalization strategy therefore needs to include a better representation of the study programs for everyone to benefit the enrollment for foreign students to the study programs under review. The experts highlight that also a stronger emphasis on English in the study programs would allow non-Indonesian speaking students to overcome this barrier.

The experts confirm that UNESA has issued admission requirements and procedures, which are binding and transparent. Based on the experience of students, the experts acknowledge that UNESA supports students in compensating missing admission requirements such as lack of knowledge in education. In such a case, appropriate courses to acquire the necessary competences are offered. The experts see evidence in the submitted documents and discussions during the on-site visit that UNESA has rules in place for the recognition of qualifications achieved externally. However, the experts failed to find these requirements as well as details on the admission requirements online (especially in English). The experts strongly recommend UNESA to add this information to their webpage to make it easily available for everyone interested in studying at UNESA. Students outside UNESA need to have easy access to confirm that they are entitled to join the programs under review.

Criterion 1.5 Workload and Credits

Evidence:

- Self-assessment report
- Module handbook of each study program
- Academic guidelines for the doctoral programs
- Academic guidelines for the master programs
- Discussion during the audit

Preliminary assessment and analysis of the experts:

According to the self-assessment report and the module handbooks, UNESA has implemented a workload based credit-point system following guidelines from the Indonesian government. Although the terminology uses the Indonesian credit point in each program (credit union, CU or sks in Indonesian), different definitions are in place for master and

doctoral programs. Likewise, the conversion to the European Credit Transfer and Accumulation System (ECTS) credit points differs. The credit point system considers student learning, structured learning and independent learning. UNESA classifies research and field work as a form or structure learning or individual learning depending on the context. In the doctoral program, the amount of independent learning is increasing, contributing to the different calculations in the ECTS conversion.

In the self-assessment report, UNESA defines that one credit point in the master program is equivalent to 240 minutes of learning activities per week consisting of 50 minutes of face-to-face lecture activities, 90 minutes of structured assignments, and independent study activities for 100 minutes. Based on the Academic Guidelines, every master study program has a total workload of 40 to 46 CUs. While the master program Mathematics Education has 46 CUs equal to 103 ECTS credits, the master program Science Education has 45 CUs. Considering a workload of 240 minutes per week, students' workload per credit in MPME of 2.9 hours of learning and assignments. The workload in MPSE is 2.8 hours for one CU. Thus, the ECTS workload in MPME is equal to 103.0 ECTS credits, whereas MPSE has a total workload of 100.8 ECTS credits. The average of students per semester ranges between 25 and 26 ECTS credits. Students are free to take additional courses voluntarily if they consider it necessary for their research topic and personal skills.

In contrast, UNESA has issued that one CU in the doctoral programs considers 270 minutes per week. The program DPME has 48 CUs, which transfer likewise to 121.0 ECTS credits. The program DPSE needs the students to complete 47 CUs converting to 118.4 ECTS credits. The average workload for the students per semester ranges between 19.5 and 20.5 ECTS credits. Similarly, doctoral students can take additional courses if they want to improve their skills and competences.

Based on the discussion, the experts learn that UNESA monitors if the real workload represents the number of awarded credits in each module. This includes in particular the time spend on assignments. According to the program coordinators, the lecturers discuss the workload with them before the assignment giving clear guidelines of the involved learning activities. Moreover, the students receive a questionnaire at the end of the semester, which includes questions on workload and learning processes. Moreover, the workload of each course is listed in the module handbook of each study program.

According to the students, the workload in all study programs under review is manageable. They state that the work in the master and doctoral programs requires strategies for time management, especially consider the work on assignments. Nevertheless, they do not complain about the workload in their studies programs. This is in agreement with the data presented by UNESA on student satisfaction with their assignments as presented below:

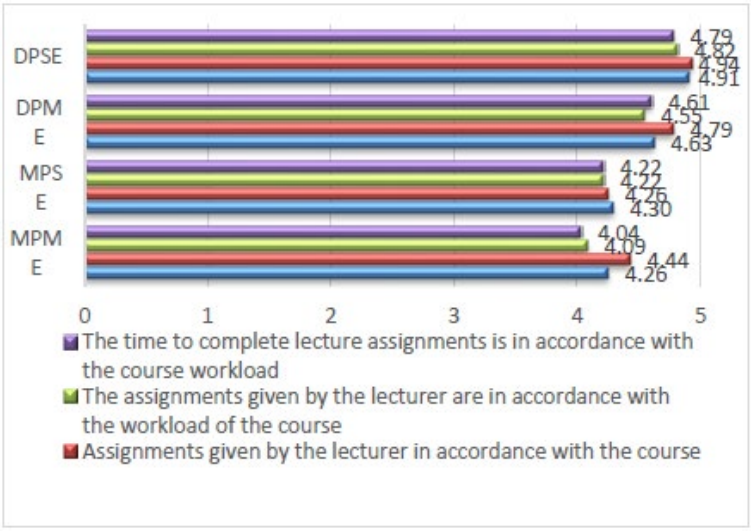


Figure 5: Results of student satisfaction survey on the course workload; results are based on 122 students using a scale from 0 to 5 (source: self-assessment report)

However, UNESA presents in its self-assessment report also the data for the four study programs under review showing slightly decreased satisfaction values for the MPSE and MPME, but high values for DPME and DPSE.

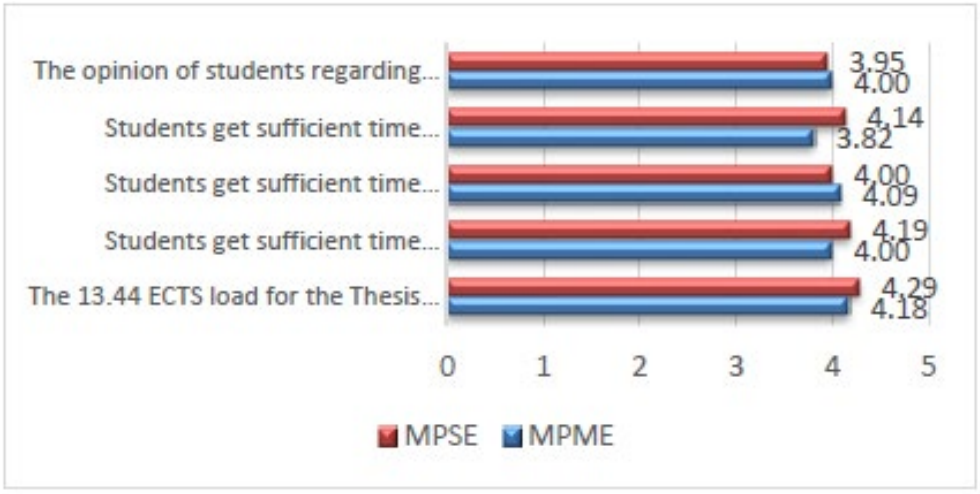


Figure 6. Results of student satisfaction survey on the course workload of MPSE and MPME; results are based on 34 students using a scale from 0 to 5 (source: self-assessment report)

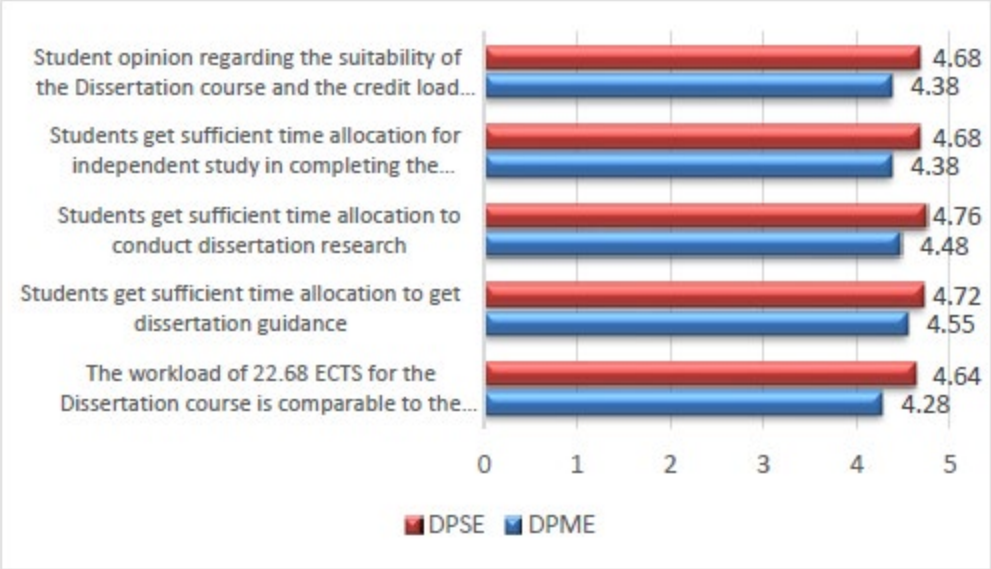


Figure 7 Results of student satisfaction survey on the course workload of DPSE and DPME; results are based on 54 students using a scale from 0 to 5 (source: self-assessment report)

In conclusion, the experts confirm that a credit system based on the student workload is implemented in the four study programs under review. The workload includes contact hours and self-study time. Furthermore, all mandatory activities are awarded with credit points. The experts confirm that the estimated workload is realistic and well-founded; it allows the students to completed their studies in the standard period of study. The experts further saw evidence that UNESA closely monitors the actual workload of the students and takes action if mismatches are identified. Students are involved in these processes.

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:

UNESA describes in its self-assessment report that the teaching methods are selected to match the characteristics of the subject of each study programs to support the students to achieve the PLOs. At UNESA, teaching considers student-centered approaches. Lecturers aim to include discussions, presentations, inquiries, case studies, project based learning, article reviews, seminars, scientific article writing, and publications. According to the documentation, students are encouraged to take initiatives in the lectures to learn to express

their opinion and develop their skills in critical and creative thinking. The experts further learn that UNESA has a policy for applying blended learning as well as guidelines for organizing e-learning courses and materials. UNESA describes in its self-assessment report that it monitors and evaluates the effectiveness of the applied learning methods regularly. The internal quality assurance at UNESA monitors 1) preparations made by lecturers for teaching, such as lesson plans, 2) the implementation of learning carried out by the lecturer including opening, core, and closing activities of learning, 3) learning evaluation carried out by the lecturer includes attendance, assignments, midterm exams, and final exams. The results are transferred to the responsible lecturer and program coordinator for reflection.

The experts observe in the submitted module handbooks and statistical data in the self-assessment report that almost all modules apply problem-based learning, project-based learning, case studies and discussions. The students state that they enjoy working in problem-based assignments. The students further confirm to the experts that they have activities conducted online and offline. The online learning is organized inside their system, where they receive a free account. They mention that they receive digital learning materials in all courses, which are provided by the lecturers. The teaching staff supports this statement and specifies that almost all of them have experience in hybrid and blended learning. This includes topics such as virtual classrooms and augmented reality. The lecturers further add that they also include learning diaries to documents assignments and projects. The students receive problems at the beginning of the class, which they need to solve during class. The lecturer are only available for consultation. The experts acknowledge the various topics addressed in the lecturers. Nevertheless, they identify a strong focus on problem-based and project-based learning. In the opinion of the experts, these methods are suitable for teaching masters and doctoral programs; however, they consider a strict limitation to these methods as an obstacle. They are convinced that certain topics require different methods for teaching and learning. These methods might include among others, work-examples, inverted classroom or lecture-based teaching with cognitive activation.

Upon questions, the program coordinators admit that currently, there are no modules fully organized in English in the four study programs under review. In some courses, bilingual materials are used. This involves mainly slides and reading materials; however, the main spoken language remains Bahasa Indonesia. The experts identify here also the need for improvement. Although the experts acknowledge the importance of reading materials, especially scientific books and publications, but emphasize that the students should regularly engage in conversion in English to improve their proficiency. This should include presentations in English as well as writing the final thesis in English. The experts acknowledge that students are already active in publishing their research, but observe that most of the re-

search collaborations take place within Indonesia. The experts consider it important to focus involving international partners in their research projects, especially on the doctoral level. This would provide more opportunities to the students but places higher requirements on their English competencies. The experts therefore consider it essential to conduct classes fully in English, especially within the PhD programs DPME and DPSE.

The experts summarize that UNESA has integrated a variety of teaching methods and didactic means in the study programs under review to promote achieving the learning outcomes. This includes strategies and guidelines from blended learning and hybrid learning to which UNESA offers a suitable infrastructure and staff development options. The master and doctoral programs involve the students in independent scientific work, which is considered an integral part of the study programme. Furthermore, the experts acknowledge the strong monitoring of the utilized learning and teaching methods. Nevertheless, the experts identify the need to increase the use of English in the classroom as well as the need to further diversify the teaching methods implemented in the four study programs.

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

Ad criterion 1.1.

UNESA describes in its statement that it will improve the collection of feedback from stakeholders with various backgrounds. It acknowledges that the input from stakeholders outside of the education system will benefit the development of the study programs. The experts appreciate the comment; they highlight the importance of diverse stakeholders on one side but also include the collection of systematic feedback on a regular timeframe (e.g. annually collection of feedback with online questionnaires). They continue to recommend E1 and E2.

Ad criterion 1.3.

The experts acknowledge that UNESA is planning to gradually increase the use of English in the master and doctoral programs under review. The experts emphasize that this is essential to support the students' research capabilities, opportunities for international collaboration as well as their future job prospects. The experts decide on the recommendation E3. UNESA's statement did not include new evidences on how to improve the students' communication skills; therefore, the experts continue to issue the recommendation E4. Furthermore, the experts keep the recommendation E5 to emphasize on the importance of student mobility in the master and doctoral programs under review. The experts appreciate UNESA's comment on increased funding, but miss evidences to document how many students will be funded, how the additional funding will be secured and where and when the

student mobility would take place. Moreover, they encourage UNESA to create opportunities for students to actively engage in research collaborations and student exchange instead of passive actions such as sit-ins or seminars.

Moreover, the experts decide on the recommendation E13. In their opinion, UNESA should consider to prolong the internship in the master programs Mathematics Education and Science Education to allow the students more time to collect data for their research.

Ad criterion 1.4.

The experts approve that UNESA has included details on the admission in English and Bahasa Indonesia on their webpage. They continue to recommend E6 to increase the number of international students in the study programs.

To ensure the English competences of the PhD students and thus their ability to conduct meaningful research, the experts continue to issue the recommendation E15.

Ad criterion 1.5.

The experts acknowledge UNESA's statement; however, they consider that additional information is needed on the implemented teaching methods of the study programs. The experts decide on the recommendation E7.

2. Exams: System, Concept and Organization

Criterion 2 Exams: System, Concept and Organization

Evidence:

- Self-assessment report
- Module handbook of each study program
- Academic Guidelines for master programs
- Academic Guidelines for doctoral programs
- Exam regulations
- Examples of exams
- Examples of master thesis
- Examples of doctoral thesis
- Discussion during the audit

Preliminary assessment and analysis of the experts:

UNESA describes in its self-assessment report that the examinations follow UNESA's academic guidelines and defined four types of assessment for the final grade. These include mid-term exams (in the 8th week of the semester), final exams (15th week of the semester), assignments (project reports, quizzes, etc.), and class participation. The final grade in the majority of modules consider 20% class participation, 30% assignments, 20% mid-term exam and 30% final exam for their final grade. UNESA uses a scale of 0–100 with the following score conversion:

Table 2. Overview of the conversion of scores to grades at UNESA.

Score Interval	Score	Grade	Category
85≤ A ≤100	4	A	Excellent
80≤ A- <85	3,75	A-	Excellent
75≤ B+ <80	3,5	B+	Good
70≤ B <75	3	B	Good
65≤ B- <70	2,75	B-	Satisfied
60≤ C+ <65	2,5	C+	Satisfied
55≤ C <60	2	C	Satisfied
40≤ D <55	1	D	Failed
0≤ E <40	0	E	Failed

These assessment methods and grading system is applied to all courses at UNESA with few exceptions such as internships and theses.

According to the self-assessment report, the mid-term and final examinations are mainly conducted in written form. Alternative examination forms are for example project-based or practice tests. The experts observe that assessment methods are included in the module handbook and lesson plan to give information to the students. The program coordinators add that lecturers additionally inform the students at the beginning of each course. They add that students also have one full week to prepare for their final exams. The experts further confirm that exam regulations are officially in place. These also regulate that students who cannot take part in one examination due to illness or disaster can retake the examination after handing in a medical letter or a statement of their parents. UNESA describes that the lecturers have two weeks to correct the final examinations. The final scores of the examination and the final grades are uploaded into the UNESA online system (SIAKADU), which students can access. The experts further acknowledge that UNESA provides the students with a document explaining steps to appeal their grades.

UNESA explains in its self-assessment report that the grading of the internships in the programs MPME and MPSE considers predominately the performance of the students. This includes evaluation of teaching performance, of the student-developed teaching and learning materials, the internship report and the presentation of the internship report. The supervisor of UNESA will evaluate the students in collaboration with the supervisor for the host organization.

The experts ask on more details for the continuous assessment of the students for the master programs *Mathematics Education* and *Science Education*. They learn from the program coordinators that this type of assessment strongly varies between the topics and lecturers. While some lecturers use quizzes, others use individual and group assignments for assessment during the semester. The results of quizzes and assignment are usually discussed in class, whereas some are graded by the lecturers. Exercises are further integrated into the modules. The program coordinators remind the experts that all details are given in the module handbooks, which list all assessment methods applied in one course. The students confirm to the experts that they are aware of the assessment methods. They add that in their experience examination questions are in line with the content of the lectures.

The experts approve that UNESA strongly supports its students to publish during their master and PhD studies. UNESA offers a course on publication in a two CU course for master students and a five CU course for doctoral students. Students learn how to write manuscripts suitable for international standard publications. The experts appreciate UNESA's support for students' research activities. Students commonly work together with their lecturers under research umbrellas, which combines students from different levels. Students in the master program are encouraged to publish at least one manuscript, preferably in international journals. However, national journals on the SINTA level one to four are also acceptable. The program coordinators add that one limitation for the research for students is that their activities are not supported by sponsors. Therefore, students on the master and doctoral level often work leading to difficulties in time management and completing their thesis. According to the program coordinators, UNESA has already identified this as a problem and currently aims to develop strategies to improve this situation.

Considering the final projects and request additional information on the selection of research topics, the program coordinators explain that at first, the departments offer available research topics to the students. For example, in DPME, students mainly choose topics on cognitive processes, although ethnomathematics was trending in Indonesia recently. Generally, the supervisor(s) discuss the topics personally with their students. When students want to work on a different topics, the supervisors encourage them to read on the current trends in their field of interest and present them their ideas. In these cases, they

develop the research topic in collaboration. The program coordinators specify that the topics are not limited as long as the students produce creative and innovative research. Moreover, UNESA ensures that research meets the requirements by closely monitoring the students' work. The students have to initially present their research proposal in front of panel of five members to receive guidance and advice. The students then conduct research under supervision before they present their conclusion at the seminar in front of the same panel, who evaluated their proposal. The panel will then decide if the results are sufficient to complete the thesis. The program coordinators add that UNESA offers the students guidelines for the master and the doctoral thesis. The guidelines explain the requirements of the Indonesian Qualification Framework as well as each step for conducting research and scientific writing. The students confirm that they are satisfied with the organization and supervision of their master and doctoral theses. According to the students, they will contact their supervisor(s) directly to arrange a meeting with them to discuss their research project. The supervision differs case by case. While some report that they arrange meetings with their supervisors on a regular basis, others mention not to have meetings regularly. Online meetings are possible, especially when external supervisors are involved. Students in DPSE specify that they always have regular meetings on Fridays to discuss their research with their supervisor(s). They add that several meetings take place online, although they prefer to arrange personal meetings. The experts identify here a broad range of supervision methods. Although supervision strongly depends on the topic and the involved people, the experts consider that regular meetings are essential for good supervision. The experts therefore emphasize that UNESA should start to monitor the supervision process during master and doctoral programs and guarantee that all students engage in monthly meetings with their supervisor. Although the experts acknowledge the advantages of online meetings, especially with supervisors outside UNESA, they indicate that personal discussions are of great importance in particular for the student development.

The experts continue to discuss the type of investigations students do during their research projects. The students explain that this depends on their area of research. Most students mention to the experts that their thesis was based on empiric data they had collect at school. These school projects require initial planning and obtaining permission from the school principals and parents.

The experts summarize that UNESA has issued rules and regulations for the assessment of courses. The presented exams are prepared in a way to allow assessing the extent to which the defined learning objectives have been achieved. The experts confirm that UNESA has prepared documents, which give the students sufficient insight into the assessment forms in each module. The experts see evidence that UNESA provides students with feedback on the competencies that they have acquired.

All four study programs under review conclude with a final thesis or final project in which the students demonstrate that they are able to work independently on a task at the intended level of the study program. The experts acknowledge that various examination methods are integrated, including predominately written exams, assignments, quizzes and practical work. The students confirm to the experts that the number and distribution of exams ensure an adequate workload as well as sufficient time for preparation.

3. Resources

Criterion 3.1 Staff and Staff Development

Evidence:

- Self-assessment report
- Staff handbooks
- Discussion during the audit

Preliminary assessment and analysis of the experts:

UNESA describes in their submitted documents and during the on-site visit that all staff involved at teaching in the master and doctoral programs under review are based in one Faculty, which combines programs on science and on education. Therefore, collaboration between single members with different backgrounds is quite common. UNESA included the following overview of the academic staff involved in teaching

Table 3. Number of staff according to their qualifications (source: self-assessment report).

Category	MPME	DPME	MPSE	DPSE
Professors	5	5	8	10
Associate Professors	13	12	9	6
Assistant Professors	4	2	2	0
Total Teaching Staffs	**22**	**19**	**19**	**16**

UNESA stats that all staff involved in teaching master and doctoral have to hold a doctoral degree. They have graduated from various national and international universities. Several of the professors are also involved in teaching courses and supervising students in the master and doctoral programs. The overall student to staff ratios remains low, for example 1:6 in MPEM, and 1:4 in DPME. Based on the most recent student satisfaction surveys presented in the self-assessment report, the students express a high satisfaction with their lecturers (values between 3.4 and 3.9 on a scale of 0 to 4). The experts consider the number and qualifications of the academic staff as suitable to reach the indented PEOs in these programs.

The experts discuss UNESA's strategic plan to increase research productivity in detail. The representatives of the rector's office state that they aim to ensure that each academic staff member is strongly engaged in research. In the future, this should include nationally and internationally funded research projects on larger scale involving collaborative research within and outside UNESA. Furthermore, UNESA encourages its staff to publish their research in nationally accredited or international research journals. To enforce this strategy, UNESA plans to install sanctions for lecturers, who continue to fail to publish such as cuts in their research budget. In contrary, incentives will be paid to every person, who successfully publishes in internationally respected journals. According to UNESA's strategic plan, the total amount of publications at UNESA per year is supposed to surpass 1000 by the end of 2029. The representatives of the rector's office add that UNESA supports its academic staff with increases in funding and incentives to improve their research output. Additionally, UNESA offers special funds for individuals to join the professorship acceleration program to reach the status of full professor quickly. The representatives of the rector's office specify that UNESA expects its academic staff to become strong in science; however, each lecturer needs to continue to fulfill their responsibility in community service by defining at least one community service project. Thus, it is also common to invite students to join community service projects. The experts agree with UNESA's strategy; they strongly encourage the lecturers to increase their research activities, especially about research grants. The experts highlight that staff members should increase their effort to compete for larger research projects as well as international grants. In the opinion of the experts, the research of the reaching staff misses projects on an international basis, which would strongly benefit the study programs and its students.

The experts receive information that UNESA offers a Center of Publication, which supports the students and staff in publishing their research work. This includes translations of manuscripts as well as proof reading. The program coordinators describe their motivation to improve their research and publication activities. This also includes expanding their international research collaboration. The teaching staff mentions that they have already close

collaboration with Universiti Teknologi MARA outside Kuala Lumpur and National Taiwan Normal University in Taipei.

The experts are further interested in the condition to form a research group. The lecturers describe that they initially need to get a research project granted to form a research group. This allows them to open vacancies for these positions. Usually, larger projects involve up to 20 to 30 students from different levels. For example, one granted project focusing on education on a small Indonesian island, they included 20 undergraduate students, six master students and one PhD candidate. All students, who fulfill the research requirements, can then apply for these open positions. Single members of the teaching staff of *Mathematics Education* specify that they do not work with such research groups. In their field, research is mainly focused on learning materials to support professionals, research assistants and educators. These research groups are formed by students around one professor, who focuses on one or complementary projects.

The teaching staff mentions to the experts that they would need more support from the university to increase their research output, especially in proposal writing and finance. However, they acknowledge that UNESA has a Center for Publications and they offer incentives for scientific grants and publications. The teaching staff adds that UNESA also supports academic mobility. Staff members present explain to the experts that they have collaborations with universities in Thailand, where the lecturers will also teach abroad. Further, UNESA supports its staff financially in attending international conferences. The experts acknowledge the comments of the teaching staff. However, they notice that staff members rarely take part in exchange programs. Considering UNESA's internationalization strategy, the experts expect a stronger involvement of staff members in international long-term stays abroad as well as ongoing research collaborations with foreign institutions. The experts therefore strongly recommend that staff members should increase their mobility beyond international conferences. In exchange, the experts further recommend increasing the number of international guest researchers and lecturers at UNESA. The experts highlight that especially guest lecturers staying for a full semester would have a positive effect to increased collaboration in the future.

The academic staff confirms to the experts that they have access to staff development courses organized by FMIPA. This includes courses on proposal writing as well as methods to improve their teaching and research capabilities. Additionally, education and training is provided for certifications such as laboratory certificates, safety certificates and professional certificates. UNESA highlights in its self-assessment report that staff development is part of its strategic plan to ensure life-long learning. UNESA informs the experts that all academic staff has access to courses in the Applied Approach and Instructional Techniques Training (PERKERTI) conducted by the university.

After reviewing the submitted documentation and after the discussions during the on-site visit, the experts conclude that the composition, professional orientation and qualification of the teaching staff are suitable for successfully delivering study programs. The experts acknowledge that lecturers have the opportunity to further develop their professional and didactic skills and are supported in using corresponding offers. The experts appreciate that UNESA has a strong focus on research and that it supports its academic staff. In addition, UNESA is offering sufficient resources and organizational structures for conducting the study programs under review. However, the experts considers that UNESA needs to support and motivate its teaching staff to increase their activities to compete for international research grants. The experts highlight that a stronger collaboration with foreign institutions is essential increase the outgoing and incoming staff mobility. Consequently, this would have a positive impact on the number of international research publications.

Criterion 3.2 Funds and equipment

Evidence:

- Self-assessment report
- Discussion during the audit

Preliminary assessment and analysis of the experts:
According to the information in the self-assessment report, UNESA issues a Budget Business Plan, which manages the transfer of funds to the faculties and working units. This plan is taking into account UNESA's strategic plan, operation plan, and the contacts with the Ministry of Education, Culture, Research and Technology and the Ministry of Finance. It further considers the strategic plans of the faculties/working units and data collected by the internal Management Information System. UNESA's revenue is build up of one source from the government and once source from society (funds from the community).

FMIPA distributes its funds to education, research, community service, infrastructure, facilities, human resources and other uses. The experts identify significant changes in the available funding during the last years, which is due to the COVID-19 pandemic according to the representatives of the rector's office. They are interested in the founding of UNESA's strategy on ecopreneurship. The program coordinators explain that this funding is ongoing and includes bachelor, master and doctoral programs. Since the presented list has only included research and not teaching, the precise amount for each year was not given in the self-assessment report. The program coordinators add that there is a specific course on the bachelor level on ecopreneurship, which should foster their thinking in ecofriendly businesses and solving environmental problems.

During the on-site visit, the experts have the possibility to visit both campuses of UNESA. They acknowledge, among others, the facilities including the library and laboratories. UNESA's documentation shows furthermore a career center, a center of Information Technology Development and several student-supporting offices. The experts consider that the laboratories are adequate to conduct research in the study programs under review. They offer the students opportunities to conduct modern experiments and analysis.

According to the self-assessment report, UNESA has issued a cooperation guidebook to manage internal and external cooperation. This also includes advice for international guest lecture activities as well as domestic and international collaborations. Collaborations includes other universities as well as associations.

The experts conclude that UNESA has sufficient financial resources available to manage the four study programs under review, which are organized in a reliable financial plan. The experts saw evidence that it also provides equipment allowing the staff and students to engage in teaching and research on an adequate level. This includes both quantity and quality. UNESA has established regulation of its internal and external cooperations. Nevertheless, the experts identify the need to increase the number of international collaborations. On one hand, they recommend the staff to apply for international research grants to foster collaborative research with institutions beyond Indonesia. In addition, the experts notice that students and staff need to increase their international mobility. Although staff members mention possibilities to receive funding, students show a high motivation to spend more time abroad but lack sufficient financial support. The experts see similar shortcomings regarding student scholarships and research funding. The experts acknowledge that several students have successfully receive external funding; however, the experts are not satisfied with the number of scholarships concerning the master and doctoral programs. The experts highlight, that sufficient funding is essential to conduct research, especially in the doctoral programs. The experts therefore emphasize that UNESA should increase its institutional support for the students to receive funding. These could include workshops in proposal writing or institutional support in correcting proposal.

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

Ad criterion 3.1.

UNESA describes in its statement that the university offers its researchers a program allowing international collaborations. The experts approve UNESA's plan to increase the international collaboration. The experts continue to issue the recommendation E8, E9, and E10 with the aim to support UNESA internationalization strategy. The experts recommend

UNESA to develop a plan setting targets and timelines for collaborative research activities with foreign institutions. This plan should include the different aspects of submitting international grant proposals, improving staff mobility, and inviting international guest lecturers to come to UNESA.

Ad criterion 3.2.

UNESA states that it will intensify its activities to secure external funding and scholarships. The experts highlight UNESA's plan to expand the students' support system for proposal writing by offering workshops for students seeking to acquire external funding themselves. To emphasize the importance of adequate funding for students to perform and publish their research, the experts continue to recommend E11.

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 UNESA organizes module handbooks for each study program under review. However, the experts identify several issues with the presented module handbooks, which should be improved. The experts 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. Furthermore, the experts mention that the course titles could be more informative. The experts note that the module descriptions give insights into the content of the modules; however, the guiding ideas often do not match the course titles. In some cases, these titles are also incorrect. The experts further identify that not all modules in the curricula have a corresponding module description. This refers especially to the internship in the MPME and MPSE. In addition, the experts consider that the assessment methods in the course need to be clarified to increase transparency to the students. 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
- Examples of Diploma Supplements
- Examples of Transcript of Records

Preliminary assessment and analysis of the experts:

After studying the submitted documents, the experts confirm that UNESA 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 experts acknowledge that all documents are issues bilingual in Bahasa Indonesia and English.

Criterion 4.3 Relevant Rules

Evidence:

- Self-assessment report
- Webpage UNESA
- Academic guidelines for master programs
- Academic guidelines for doctoral programs
- Discussion during the audit

Preliminary assessment and analysis of the experts:

After analyzing the submitted documents, the experts acknowledge that UNESA has issued rules and regulations to manage its facilities and human resources. The experts observe that guidelines are in place to manage the structure of each study program. In addition, the students receive documents to introduce them to writing their thesis and dissertation. The students confirm to the experts that they are aware of their duties; they further have access to issued rules and regulations on the webpage and their online system. Furthermore, they consider that the module handbooks and similar documents give adequate information on their study programs.

However, during the studying of the documents, the experts notice that UNESA's webpage is not organized in a user-friendly manner. Although automatic translations are available, the translations often result in poor English, which make several texts less comprehensible for international partners. In spite of offering webpage for each study program, these pages are difficult to access via the official webpage. Furthermore, while these pages give insights into detailed information, they miss giving a clear overview of the contents of study programs. The experts recommend developing a structured overview of the study programs, which allows external students to understand the purpose and aim of the study programs, as well as the addressed topics during their studies. In the best case, this information should be available in Bahasa Indonesia and English in order to attract also international students to enroll at UNESA.

Therefore, the experts approve that UNESA has put regulations in place defining the rights and duties of both the higher education institution and students; these are clearly defined and binding for both parties. All relevant course-related information is available in the language of the degree programme and accessible for anyone involved. Nevertheless, the experts encourage UNESA to review its webpage and make it more accessible for internal and external parties.

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

Ad criterion 4.1.

UNESA appreciates in its statement that the experts pointed out various problems with the module handbooks of the study programs under review. Although UNESA states that it will improve the quality of the module handbooks, no new documents were submitted with UNESA's statement. Thus, the experts continue to issue the requirement A1.

Ad criterion 4.3.

The experts acknowledge UNESA's statement to improve their webpage and make it more user-friendly. The experts are aware that UNESA has taken the first steps to improve their online presence, but recommend further improvement in the recommendation E12.

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 UNESA has implemented a quality assurance system. They learn that there is a continuous process in order to improve the quality of the study programs and it is carried out through internal and external quality assurance. UNESA operates a quality assurance unit, which oversees external and internal processes. Therefore, this unit is responsible for the continuous improvement of study programs through monitoring, assessing, and analyzing the processes. Internal quality assurance system prepares guidelines and quality standards for all study programs and conducts internal curriculum audits.

The internal quality assurance involves units at three management levels and is conducted on university level, faculty level and program level. UNESA operates a group of people responsible at each of these units to conduct and coordinate the quality management tasks. These units collect and analyze data and control that guidelines are implemented. The internal evaluation of the quality of the study programs is mainly provided through student and alumni surveys. Students give their feedback on the courses through online questionnaires at the end of each semester. Students assess various aspects such as students' understanding, lecturers' responsiveness, course delivery, lecturers' proficiency, explanation of course objectives, and references in each enrolled course. Lecturers can see their average score based on the students' feedback from their account in SIAKADU. Other surveys involve also the management service or the satisfaction with human resources.

In addition, each department regularly conducts an alumni tracer study. By taking part at this survey, alumni can comment on their experiences at UNESA, the waiting period for employment after graduation, their professional career and can give suggestions how to improve the programme.

External quality assurance focuses on both national and international accreditations. National accreditation is mandatory for each study program and can be conducted by agencies approved by the Indonesian government.

The experts observe a well established and functioning quality management at UNESA. They received access to various surveys to improve the study programs under review. Nevertheless, the experts observe in their discussion with the industry partners that UNESA needs to improve their surveys with external stakeholders to include their feedback in improving the study programs. The experts consider it necessary to collect external feedback using questionnaires, at best in an annual basis.

The experts conclude that UNESA has implemented a quality management system to improve the quality of its study programs. In the submitted documents, the experts observe an abundance of data collected by different monitoring processes. Among others, UNESA provides data on measurement and assessment of PLO and PEO achievement. The experts observe that UNESA develops actions based on the collected data, which is considered in the curriculum development. The experts acknowledge that the vast majority of PLOs and PEOs receive high grades of achievements (excellent or good), which indicate a match of the learning content in theory and reality. UNESA furthermore monitors the overall performance of the graduates considering their GPA, study time number of graduates. According to the presented surveys, most students graduate with a GPA surpassing 3.0 in the study programs under review (on a scale of 0 to 4). Students reach graduation in between two and three years in MPME. Similarly, most graduates from DPME reach GPAs about 3.5, and take less than four years to complete their studies. Similar high GPAs (average of 3.8) are detected in MPSE, who manage to finish their studies in less than four years. These values are comparable to the graduates in DPSE.

Additional tracer studies show a high overall satisfaction of the alumni; moreover, the majority of graduates finds occupation in jobs related to their studies. According to the tracer study, the experts notice high satisfaction of the graduates in DPME with the exception of English skills. These data support the experts' previous statement to improve the English proficiency of the students (criterion 1.3). Other lower values are detected in information and technology, which UNESA currently organizes on an individual basis. Likewise, the satisfaction survey also shows good levels only in reference to the English competences of the students of MPSE and DPSE, which further indicate a room for improvement in regard to information and technology skills.

The experts therefore acknowledge that UNESA involves various stakeholders in their quality management process, including students and alumni. However, the discussion with the partners from the industry revealed that these stakeholders were so far not invited to participate in UNESA's surveys. The experts emphasize that the feedback from all external stakeholders is essential to consider in the improvement of the study programs. They suggest to conduct regular surveys with the partners from the industry to ask for feedback on the qualification profile, PEOs, PLOs and curriculum. These results need to be incorporated

into the processes for study program development. The experts confirm that students have access to the results of the surveys.

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

As described in criterion 1.1., UNESA describes in its statement that it aims to diversify the type of stakeholders involved in the development of the study programs and curricula. The experts approve UNESA's comment but continue to issue the recommendation E1. They recommend that UNESA should improve its quality management strategy to document the details of the survey time interval of the different kind of surveys it conducts.

D Additional Criteria for Structured Doctoral Programs

Criterion D 1 Research

Evidence:

- Self-assessment report
- Academic guidelines for doctoral programs
- Sample of published dissertations
- Samples of publications in scientific journals
- Discussion during the audit

Preliminary assessment and analysis of the experts:

The experts acknowledge that doctoral students have to pass a set of courses in the first and second semester of their studies before they engage in research activities. The program coordinators and students confirm that the selection of courses for the doctoral programs compliment the students' knowledge and skills and prepare them for working on their doctoral thesis. During this first year, the students need to work on the research proposal for their doctoral thesis together with their supervisor(s). The students have to present their proposal in front of a five-person committee, who will rate the proposal and give additional advice for improvement. While the research in the Department of Mathematics Education mainly addresses cogitative psychology (problem-solving, problem posing, anal-

ysis of student cognition), models and instructional models, and assessment in mathematics education, the scientific focus of the Department of Science Education is on innovative learning modules, students' misconceptions, curriculum and assessment, and ICT-based science learning. UNESA presents the following numbers of dissertation thesis in the last years based on research groups:

Table 4. Number of dissertation in the different research groups of DPME (source: self-assessment report).

Research group	numbers of dissertation titles per year							
	2016	2017	2018	2019	2020	2021	2022	2023 (ongoing)
Innovative Learning Model Mathematics Education	2	1	0	1	1	1	1	2
Instructional Models of Mathematics Education	5	10	8	21	10	11	11	28
Assessment in Mathematics Education	0	0	0	0	0	0	1	3

Table 5. Number of dissertation in the different research groups of DPSE (source: self-assessment report).

Research group	numbers of dissertation titles per year							
	2016	2017	2018	2019	2020	2021	2022	2023 (ongoing)
Innovative Learning Model Science Education	13	15	16	28	7	1	7	NA
Misconceptions	1	0	2	2	0	0	0	NA
Curriculum and Assessment	2	3	4	2	0	0	0	NA
ICT in Science and Learning	1	1	0	0	0	0	0	NA

UNESA states in its self-assessment report that it provides the students with access to modern literature and equipment to support their research. The experts learn that students in

DPME and DPSE are involved in research projects, which enable them to publish in international recognized journals. UNESA offers additional scientific writing courses, where students receive credits after successfully publishing a scientific article. In addition, workshops are available through a group called Cooperation, Publication and Internationalization. The experts approve that that students also receive incentives for their publications, similarly to the academic staff at UNESA. The program coordinators are convinced that the high number of student publications shows the good research environment at UNESA. In order to improve the interaction and science communication, seminars are regularly organized to present new research results. In additional, speakers from outside the campus are invited to present the latest research developments and issues related to research methodology. UNESA presents the following data on research publications by students in international journals:

Table 6. Overview of the number of publication in each year by students in the doctoral programs under review; P = Proceedings, J = Journal Article (source: self-assessment report)

	year of publication							
	2019		**2020**		**2021**		**2022**	
	P	J	P	J	P	J	P	J
DPSE	7	8	10	12	20	4	6	11
DPME	4	9	1	8	5	37	6	12

The experts conclude that the doctoral program DPME and DPSE involve scientific work that contributes to the advancement of knowledge through original research. The experts see evidence that graduates acquire advanced, cutting-edge knowledge and are able to demonstrate, on the level of internationally recognized scientific research, a deep and comprehensive understanding of their research field. They demonstrate the ability to design and carry out an original research project at the forefront of the discipline, contribute to the advancement of science, and are able to adequately present the results to different audiences. The experts consider especially the high number of publications among students as positive.

Criterion D 2 Duration and Credits

Evidence:

- Self-assessment report
- Academic guidelines for doctoral programs

- Module handbooks of DPME and DPSE
- Statistical data on graduation time
- Discussion during the audit

Preliminary assessment and analysis of the experts:
Both doctoral study programs under review are designed as full-time programs to be completed in six semesters or three academic years. While the program MPME has 48 credit units (CUs) equivalent to 121.0 ECTS credits; the program DPSE has 47 CUs converting to 118.4 ECTS credits. These includes credits for compulsory and electives courses. The module "Dissertation" represents 9 CUs (22.7 ECTS) and is accompanied by "Independent study for supporting dissertation" (2 CU, 5.0 ECTS), "Publication "(5 CU, 12.6 ECTS), and Seminar of the Research Product" (5 CU, 12.6 ECTS) in DPSE or "Seminar of Research Result" (5 CU, 12.6 ECTS) in DPME.

According to the regulations of the Indonesian government, students have to complete their doctoral thesis within 14 semesters or seven years. UNESA presents documentation during the on-site visit that the average study duration is 4.42 years in DPSE and ranges in DPME between 3.8 and 5.9 years.

Therefore, the experts conclude that UNESA operates structured doctoral programs within an appropriate time duration. Both programs apply the Indonesian credit point system. The experts confirm that UNESA tracks the student process during their doctoral studies based on cohorts. In the opinion of the experts, however, the number of courses in the PhD programs is still high. The experts acknowledge national requirements, but highlight that the compulsory courses in DPME and DPSE contain a high number of courses in mathematics and science; it would be more beneficial for PhD students to receive an in depth introduction to scientific methods, which prepare them for their dissertation and their future as researchers (see criterion 1.3). In addition, courses on various topics of science could still be available as electives, complementing their interests in their field of expertise.

Criterion D 3 Soft Skills and Mobility

Evidence:

- Self-assessment report
- Statistical data on student mobility
- Discussion during the audit

Preliminary assessment and analysis of the experts:

UNESA acknowledges according to the submitted documents as well as the discussions during the on-site visit that soft skills are of great importance for students, including doctoral students. The experts learn that DPSE and DPME provide the students with opportunities to improve their soft skills regarding personal and professional development. The students have access to UNESA's institutional support in career development and international mobility. The study programs aim to foster social aptitude, language and communication skills, the ability to work in teams and critical and creative thinking. In addition, the students should gain self-confidence to interact in their specific scientific community and present responsibility and ethics in their work. UNESA describes to the experts that the set of courses in the first year of the study programs contributes to the development of soft skills.

The mobility of the students in DPME and DPSE considers international conferences, trainings, workshops and other courses they have participated outside UNESA (domestic and international). In the self-assessment report, UNESA presents the following numbers:

Table 7. Student mobility in the doctoral programs DPME and DPSE.

Year	International Conferences		Trainings/Workshops		Transfer Credit/Seat in	
	DPME	DPSE	DPME	DPSE	DPME	DPSE
2019	2	5	1	0	2	0
2020	8	13	3	1	8	0
2021	20	18	1	2	20	2
2022	12	7	0	8	12	0

UNESA explains that most international collaboration in the doctoral programs take place with institutions in the Philippines, Australia, Thailand, Japan, India, East Timor, Kazakhstan and the USA.

The experts summarize that the doctoral candidates have access to a wide range of opportunities for their personal and professional development and take advantage of institutional support for career development and mobility. This includes support structures for professional development, training in transferable skills, and preparation for career choices. The experts approve that UNESA provides opportunities for academic mobility and international collaboration within an integrated framework of cooperation between universities and other partners. The experts consider that doctoral students should increase their international mobility, particularly regarding long-term stays abroad. Especially research stays at laboratories outside UNESA would positively influence the students' research network and experience. Read more on student mobility in criterion 1.3.

Criterion D 4 Supervision and Assessment

Evidence:

- Self-assessment report
- Doctoral student satisfaction survey
- Discussion during the audit

Preliminary assessment and analysis of the experts:
In its self-assessment report, UNESA describes that doctoral students are entered into an internal system (SIMONTASI) to monitor their study progress. This mainly tracks the following steps (1) dissertation guidance stage, (2) research validation stage, (3) proposal examination stage, (4) result seminar stage, (5) dissertation feasibility stage, (6) closed exam phase, and (7) open exam phase. The open exam phase can be skipped when students have already published at least two publications in international journals (at least Q4). These steps allow UNESA to monitor the students' progress while also giving them guidance in their scientific work. The students further receive mentoring from their supervisor(s) during their research activities. UNESA presents satisfaction survey of the doctoral students of DPME and DPSE confirming a high satisfaction with the supervision during their research and dissertation writing.

The experts learn that to supervise students during their doctoral students, the lecturer needs to hold a PhD degree and have published in international journals as a first or corresponding author. The supervision is based on the expertise of the lecturer; however, the total number of PhD students per semester is limited to five to ensure good supervision. Nevertheless, students in DPME mention, that meetings with their supervisors do not regularly take place. In addition, the majority of these meetings take place online. The experts acknowledge the challenges to organize meetings or students and their supervisor(s); nevertheless, they highlight the importance of regular meetings to discuss the process of research and writing of manuscripts and theses. The experts therefore advise UNESA to stronger control that students have regular meetings with their supervisors. In the best case, these meetings should take place in person unless external supervisors need to be involved. According to the opinion of the experts, students are entitled to receive good supervision and this demands the attention of their supervisor and their guidance.

The program coordinators emphasize that the students receive a detailed introduction at the beginning of their studies to direct their research ideas. The students are aware that UNESA requires them to publish; therefore, the lecturers encourage them to publish early during their studies. Publications are the biggest obstacle for students to finish on time.

This combines their research activities as well as their skills in writing publications (potentially in English), which is new to most students.

The experts confirm that UNESA has established guidelines for a transparent contractual framework of shared responsibilities between doctoral candidates, supervisors, and the institution. The experts approve that a continuous support by their supervisors is provided.

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

UNESA describes in its statement that a framework for good supervision exists at UNESA. Nevertheless, the experts observed contradictory statements during their on-site visit. The experts highlight that a good supervision is essential for doctoral students to finish their studies and research in time. They recommend UNESA to closely monitor if good supervision is enforced at the doctoral programs. They decide on the recommendation E14.

Criterion D 5 Infrastructure

Evidence:

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

Preliminary assessment and analysis of the experts:

UNESA describes in its self-assessment report that the students enrolled in the programs MPSE and DPME have access to facilities and infrastructure allowing them to conduct their research activities. Students in DPSE have access to several science laboratories as well as one learning laboratory for microteaching. Students in DPME receive the opportunities to use a math laboratory and one learning laboratory for microteaching. Students further have access to facilities outside the UNESA campuses to collect research data. Next to access to equipment, students receive full access to the library with online access to research articles and publication infrastructure. When needed, they have access to all UNESA facilities including the education development center, the language center for foreign language training and the entrepreneurship laboratory. UNESA collaborates with Springer, and Emerald to provide literature, books, and articles for every student.

According to the experts, UNESA provides the doctoral students of DPME and DPSE with an adequate research environment that allows them to appropriately carry out their research projects.

Criterion D 6 Funding

Evidence:

- Self-assessment report
- Discussion during the audit

Preliminary assessment and analysis of the experts:

According to the self-assessment report, UNESA's Research and Community Service Institute centrally manage all research and community service. This include verification of research policies as well as technical guidance and outreach. The expert acknowledge that UNESA provides scholarship services for its doctoral students. This includes among others the scholarships from UNESA, regional collaboration partners and domestic postgraduate education scholarships. UNESA highlights that students have previously been applying to obtain external funding. Although the experts notice that students have previously received external funding, the experts consider that the percentage of students receiving financial support is still very low. Since the experts consider doctoral research without sufficient funding as not feasible, the experts encourage UNESA to provide a stronger institutional support. This concerns especially attempts to increase the students' competitiveness to win external funding including national and company grants to conduct their research. More details are discussed in criterion 3.2.

The students highlight that external funding or promotors greatly supported them to conduct and publish their research. Furthermore, study programs are part of the Departments of Mathematical Education and Science Education and therefore receive funding from UNESA as described in criterion 3.2.

Final assessment of the experts after the comment of the Higher Education Institution regarding criterion D 6:

The experts continue to highlight the competitive nature of scholarship grants on a national level. Due to the limited funding on governmental level, the experts consider it not sufficient to inform and encourage the students about funding opportunities. They emphasize that UNESA needs to improve its supportive structure to support the students during the process of proposal writing and submission. See more details in criterion 3.2.

Criterion D 7 Quality Assurance

Evidence:

- Self-assessment report
- Academic regulations of doctoral programs
- Discussion during the audit

Preliminary assessment and analysis of the experts:

UNESA states that quality assurance follows national requirements as well as the regulations and guidelines for structured doctoral programs. This includes internal and external quality assurance as described in criterion 5. The experts approve that UNESA has implemented various instruments for quality assurance and uses the collected data to continue to improve the study programs under review. Moreover, the experts are provided with access to results of evaluations and monitoring processes of the programs DPME and DPSE.

In conclusion, the experts confirm that UNESA has implemented a quality assurance system, which collects data for improvement of the structured doctoral programs DPME and DPSE. Regulations are in place defining the rights and duties of doctoral students as well as UNESA. Based on the discussion with the students, the experts are aware that the students know about their rights and that rules of good scientific practice are integrated into UNESA's environment. The experts have access to data related to individual progression of doctoral students, their study duration, publication rate, and career tracking based of tracer studies. UNESA uses this data to continuously assess the quality of the structured doctoral programme.

E Additional Documents

No additional documents needed.

F Comment of the Higher Education Institution (21.02.2024)

The institution provided a detailed statement :

The Comment of the Higher Education Institution

For ASIIN Seal Accreditation Report

Master's Degree Programme

Mathematics Education

Science Education

PhD Programme

Mathematics Education

Science Education

February, 20th 2024

Faculty of Mathematics and Natural Sciences
UNIVERSITAS NEGERI SURABAYA
2024

EXPERT REPORT FOR THE ASIIN SEAL

- **The comment of the Higher Education Institution Regarding Criterion 1:**

For Criterion 1.1 Objective and Learning Outcomes of a Degree Programme

Thank you for the advice provided by the experts. We will consider this suggestion for future improvement by inviting several stakeholders with various backgrounds so that we can see the market needs as a whole.

For Criterion 1.2 Name of the Degree Programme

Thank you for the remark written by the expert. We already work on the webpage of FMIPA and it has been revised about the translation of study program of science education. We have already made sure that all translations are consistent and fully established in English.

For Criterion 1.3 Module Curriculum

We agree that scholarships and research funding are needed to produce the research quality results and publications. In fact, funding has been provided by the directorate of higher education and universities on a competitive basis through research grants for master and doctoral students. To support students for research grants, there are several activities in the study program to improve the quality of research proposals such as coaching clinics, proofreading activities, etc. Therefore, there is a greater opportunity for obtaining research funding. Research funding for students is also carried out through collaborative research with lecturers. We also agree that the orientation of lectures at DPME and DPSE is directed towards research courses or research dissemination, so there is a policy to change the direction of scientific courses towards research courses or research dissemination. The general structure for the doctoral program will be simplified by putting scientific courses for the first two semester so that student can focus on research and dissemination afterwards.

Regarding the use of English, we agree to including a higher amount of English in the class room. All lecturers are encouraged to use English in their classroom such as by using the English-language references and providing assignment in English (oral and written). Apart from that, English language improvement for students is carried out through the University

Language Center.

Student Mobility

We really appreciate the conclusions provided by the experts. This conclusion is in accordance with university conditions and policies. Currently, student mobility will be increased through funding support by university for students to attends seminars, sit-ins and interactions with experts abroad.

Periodic Review of the Curriculum

All study programs held curriculum reviews activities periodically and involved partners from industries or stakeholders. However, not all partners were available to come to the discussion session with experts. Therefore, we asked for representative of them through their institution to join the session. This condition might become the reason why the representatives didn't know about the curriculum review. Nevertheless, we ensure the process of review curriculum involve partners from industries and stakeholders. Regarding the systematic survey for private sector and industry partners, we agree to do improvement on it. We will conduct the stakeholders survey including feedback on the study programs as well as the curricula.

For Criterion 1.4 Admission Requirements

Regarding the requirement of admission, we provided the information about the admission requirement online in Bahasa and English. It can be accessed through this webpage: https://admisi.unesa.ac.id/page/tata-cara-pendaftaran.

For Criterion 1.5 Workload and Credits

We appreciate this conclusion and confirm this information, so that we will ensure that students get the best service system.

For Criterion 1.6 Didactic and Teaching Methodology

We appreciate this conclusion. The use of English in lectures will be carried out for several courses at least when presenting assignments or student work. Apart from that, we will diversify the lecture model according to the course content which is not only inquiry, but a combination of inquiry, expository, exploratory and project.

- **The comment of the Higher Education Institution Regarding Criterion 2:**

We appreciate this conclusion and will facilitate students to achieve learning objectives through sustainable assessment system by adjusting the workload to a sufficient and adequate level.

- **The comment of the Higher Education Institution Regarding Criterion 3:**

For Criterion 3.1 Module Descriptions

We appreciate the conclusions of the experts and are grateful for their input for our lecturers in competing for international research grants and collaborating with international institutions. As a form of improvement, we will involve lecturers in training to prepare competitive research proposals in collaboration with overseas institutions and prepare joint research collaborations with experts in the same field abroad. Currently, Unesa has a research program that allows its lecturers to carry out collaborative research with other institutions through an international collaborative research scheme. The results obtained through this program include joint publications with Abai University (Kazakstan), National Taiwan Normal University, and Universiti Malaya (Malaysia). In this case, we will continue to make efforts to obtain financial support from Unesa which can encourage our lecturers to carry out more collaborative research with foreign institutions.

For Criterion 3.1 Funds and Equipment

We are very grateful for the input provided by experts regarding funding both in scholarships and research funds. We will try to get greater financial support from both universities and other parties. In accordance with expert advice and improvement efforts, we will provide support to students so that they get better funding through workshops in writing competitive research proposals or manuscript clinic activities to correct student research proposals.

- **The comment of the Higher Education Institution Regarding Criterion 4:**

For Criterion 4.1 Module Descriptions

We are very grateful for the suggestions provided by the experts. We will improve it according to expert advice as reinforcement in completing the modules we have created. We will add a general description, make the title more informative, appropriate descriptions, and more up to date literature.

For Criterion 4.2 Diploma and Diploma Supplement

We agree with the expert that all documents (a diploma certificate, a diploma supplement, andtranscript of records) are issues bilingual in Bahasa Indonesia and English for all of our students.

For Criterion 4.3 Relevant Rules

We are very grateful for the conclusions provided by the experts that Unesa has put regulations in place defining the rights and duties of both the higher education institution and students. In regard to your suggestion about the webpage, we will make improvements according to your suggestions so that our website is easier to access by internal and external parties.

- **The comment of the Higher Education Institution Regarding Criterion 5:**

We are grateful for the conclusions and will conduct regular surveys with partners to make the curriculum development process more credible.

ADDITIONAL CRITERIA FOR STRUCTURED DOCTORAL PROGRAMS

- **The comment of the Higher Education Institution Regarding Criterion D1:**

We really appreciate the experts' conclusions and will strive to increase the quantity and quality of international student publications.

- **The comment of the Higher Education Institution Regarding Criterion D2:**

We really appreciate the opinions and suggestions of experts to reduce the number of doctoral courses, and are grateful for their understanding that this is due to institutional course requirements and binding Indonesian national education regulations. For this reason, we have improved it by making several compulsory subjects into elective subjects and courses in the first two semesters and then focusing on dissertation research. Scientific courses are directed at preparing a dissertation research plan.

- **The comment of the Higher Education Institution Regarding Criterion D3:**

We are grateful for the conclusions and suggestions provided by the experts. We also realize that our students really need to carry out academic mobility and international collaboration within an integrated cooperation framework to provide research experience and collaborative networks with foreign institutions. In this case, we have designed an international research collaboration assistance program for students so that they can collaborate and get input from overseas researchers. Currently, we have an adjunct professor who expert in Mathematics and STEM education, Prof. Wanty Widjaja from Deakin University, Australia to carry out research collaboration with our doctoral students at DPME and DPSE. Apart from that, we have also initiated collaboration with several overseas partners to provide opportunities for students to undertake research internships and research training abroad. We will continue to increase the quantity of academic mobility for our doctoral students.

- **The comment of the Higher Education Institution Regarding Criterion D4:**

Thank you for the assessment given by the experts stating that UNESA has established guidelines for a transparent contractual framework regarding shared responsibilities between doctoral candidates, supervisors and institutions. It is a framework for study program coordinators to fulfill the needs of doctoral students at DPME and DPSE.

- **The comment of the Higher Education Institution Regarding Criterion D5:**

We are very grateful and appreciate the experts' assessment of the availability of an adequate research environment for our doctoral students. In this regard, we will also continue to improve the already good research environment to be even better in the future.

- **The comment of the Higher Education Institution Regarding Criterion D6:**

We agree with what has been written by experts regarding support from promotors to facilitate their student to conduct and publish their research and also to get external funding. In addition to the funding that has been provided by UNESA, we encourage our students to be more active in participating in research funding competitions at the national, regional and international levels so then they will have a greater opportunity to obtain external fundings.

- **The comment of the Higher Education Institution Regarding Criterion D7:**

We are very happy with the conclusion given by the experts on the D7 criteria. In this case, we will continue to mainta

G Summary: Expert recommendations (01.03.2024)

Taking into account the additional information and the comments given by five the peers 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
Ma Mathematics Education	With requirements for one year	30.09.2029	–	-
PhD Mathematics Education	With requirements for one year	30.09.2029	–	-
Ma Science Education	With requirements for one year	30.09.2029	–	
PhD Science Education	With requirements for one year	30.09.2029	–	-

Requirements
For all study programs

A 1. (ASIIN 4.1) Improve the module handbooks regarding module descriptions, titles, assessment methods, literature. Each module requires a separate module description. Each module handbook should start with an overview.

Recommendations
For all study programs

E 1. (ASIIN 1.1, 1.3 & 5) It is recommended to systematically collect feedback from partners from industry, education, etc. to improve the study programs and the curriculum.

E 2. (ASIIN 1.1) It is recommended to diversify the type of external stakeholders and involve organizations/companies outside of education.

E 3. (ASIIN 1.3) It is recommended to increase the students' English proficiency by including a higher amount of English conversation in the classroom or organizing courses fully in English.

E 4. (ASIIN 1.3) It is recommended to improve the communication skills of the students, including competences to talk to parents and other stakeholders.

E 5. (ASIIN 1.3) It is recommended to increase the student mobility (especially in the master's programs).

E 6. (ASIIN 1.4) It is recommended to increase the number of international students in the study programs.

E 7. (ASIIN 1.6) It is recommended to diversify the teaching methods and offer alternatives to problem-based, case-based and project-based learning.

E 8. (ASIIN 3.1) It is recommended to increase the support for the lecturers to acquire international grants.

E 9. (ASIIN 3.1) It is recommended to increase staff mobility at university inside Indonesia and abroad.

E 10. (ASIIN 3.1) It is recommended to increase the number of visiting lecturers.

E 11. (ASIIN 1.3, 3.2 and D6) It is recommended to increase the support for students receiving scholarships and grants. This could include training and support in writing research proposals.

E 12. (ASIIN 4.3) It is recommended to redesign the webpage to make it user-friendly for people from outside, especially all information presented in English.

Recommendations
For the Master program Mathematics Education and Master program Science Education

E 13. (ASIIN 1.3) It is recommended to prolong the duration of the internships.

Recommendations
For the PhD program Mathematics Education

E 14. (ASIIN D4) It is recommended to implement regular meetings between the students and their supervisors (if possible, in person).

Recommendations
For the PhD program Mathematics Education and Science Education

E 15. (ASIIN 1.4) It is recommended to increase the English score for admission.

H Comment of the Technical Committees

Technical Committee 09 – Chemistry, Pharmacy (13.03.2024)

Assessment and analysis for the award of the ASIIN seal:

The Technical Committee discusses the procedure and confirms the assessment of the expert group and makes no changes to the requirement or the recommendations.

The Technical Committee 09 – Chemistry, Pharmacy recommends the award of the seals as follows:

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

Requirements
For all study programs

A 1. (ASIIN 4.1) Improve the module handbooks regarding module descriptions, titles, assessment methods, literature. Each module requires a separate module description. Each module handbook should start with an overview.

Recommendations
For all study programs

E 1. (ASIIN 1.1, 1.3 & 5) It is recommended to systematically collect feedback from partners from industry, education, etc. to improve the study programs and the curriculum.

E 2. (ASIIN 1.1) It is recommended to diversify the type of external stakeholders and involve organizations/companies outside of education.

E 3. (ASIIN 1.3) It is recommended to increase the students' English proficiency by including a higher amount of English conversation in the classroom or organizing courses fully in English.

E 4. (ASIIN 1.3) It is recommended to improve the communication skills of the students, including competences to talk to parents and other stakeholders.

E 5. (ASIIN 1.3) It is recommended to increase the student mobility (especially in the master's programs).

E 6. (ASIIN 1.4) It is recommended to increase the number of international students in the study programs.

E 7. (ASIIN 1.6) It is recommended to diversify the teaching methods and offer alternatives to problem-based, case-based and project-based learning.

E 8. (ASIIN 3.1) It is recommended to increase the support for the lecturers to acquire international grants.

E 9. (ASIIN 3.1) It is recommended to increase staff mobility at university inside Indonesia and abroad.

E 10. (ASIIN 3.1) It is recommended to increase the number of visiting lecturers.

E 11. (ASIIN 1.3, 3.2 and D6) It is recommended to increase the support for students receiving scholarships and grants. This could include training and support in writing research proposals.

E 12. (ASIIN 4.3) It is recommended to redesign the webpage to make it user-friendly for people from outside, especially all information presented in English.

Recommendations
For the Master program Mathematics Education and Master program Science Education

E 13. (ASIIN 1.3) It is recommended to prolong the duration of the internships.

Recommendations
For the PhD program Mathematics Education and Science Education

E 15. (ASIIN 1.4) It is recommended to increase the English score for admission.

Technical Committee 10 – Life Sciences (14.03.2024)

Assessment and analysis for the award of the ASIIN seal:

The Technical Committee discusses the procedure and confirms the assessment of the expert group and confirms the requirement or the recommendations. Minor grammatical corrections are only made to recommendations E3 and E7.

The Technical Committee 10 – Life Sciences recommends the award of the seals as follows:

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

Requirements
For all study programs

A 1. (ASIIN 4.1) Improve the module handbooks regarding module descriptions, titles, assessment methods, literature. Each module requires a separate module description. Each module handbook should start with an overview.

Recommendations
For all study programs

E 1. (ASIIN 1.1, 1.3 & 5) It is recommended to systematically collect feedback from partners from industry, education, etc. to improve the study programs and the curriculum.

E 2. (ASIIN 1.1) It is recommended to diversify the type of external stakeholders and involve organizations/companies outside of education.

E 3. (ASIIN 1.3) It is recommended to increase the students' English proficiency by including a higher amount of English conversation in the classroom or organizing courses fully in English.

E 4. (ASIIN 1.3) It is recommended to improve the communication skills of the students, including competences to talk to pupil's parents and other stakeholders.

E 5. (ASIIN 1.3) It is recommended to increase the student mobility (especially in the master's programs).

E 6. (ASIIN 1.4) It is recommended to increase the number of international students in the study programs.

E 7. (ASIIN 1.6) It is recommended to diversify the teaching methods and offer alternatives like problem-based, case-based and project-based learning.

E 8. (ASIIN 3.1) It is recommended to increase the support for the lecturers to acquire international grants.

E 9. (ASIIN 3.1) It is recommended to increase staff mobility at university inside Indonesia and abroad.

E 10. (ASIIN 3.1) It is recommended to increase the number of visiting lecturers.

E 11. (ASIIN 1.3, 3.2 and D6) It is recommended to increase the support for students receiving scholarships and grants. This could include training and support in writing research proposals.

E 12. (ASIIN 4.3) It is recommended to redesign the webpage to make it user-friendly for people from outside, especially all information presented in English.

Recommendations
For the Master program Mathematics Education and Master program Science Education

E 13. (ASIIN 1.3) It is recommended to prolong the duration of the internships.

Recommendations
For the PhD program Mathematics Education and Science Education

E 15. (ASIIN 1.4) It is recommended to increase the English score for admission.

Technical Committee 13 – Physics (12.03.2024)

Assessment and analysis for the award of the ASIIN seal:

The Technical Committee discusses the procedures and follows the assessment of the auditors without any changes with the exception of some clarifications.

The Technical Committee 13 – Physics recommends the award of the seals as follows:

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

Requirements
For all study programs

A 1. (ASIIN 4.1) Improve the module handbooks regarding module descriptions, titles, assessment methods, literature. Each module requires a separate module description. Each module handbook should start with an overview.

Recommendations
For all study programs

E 1. (ASIIN 1.1, 1.3 & 5) It is recommended to systematically collect feedback from partners from industry, education, etc. to improve the study programs and the curriculum.

E 2. (ASIIN 1.1) It is recommended to diversify the type of external stakeholders and involve organizations/companies outside of education.

E 3. (ASIIN 1.3) It is recommended to increase the students' English proficiency by including a higher amount of English conversation in the classroom or organizing courses fully in English.

E 4. (ASIIN 1.3) It is recommended to improve the communication skills of the students regarding their future professional environment.

E 5. (ASIIN 1.3) It is recommended to increase the international student mobility (especially in the master's programs).

E 6. (ASIIN 1.4) It is recommended to increase the number of international students in the study programs.

E 7. (ASIIN 1.6) It is recommended to diversify the teaching methods.

E 8. (ASIIN 3.1) It is recommended to increase the support for the lecturers to acquire international grants.

E 9. (ASIIN 3.1) It is recommended to increase staff mobility at university inside Indonesia and abroad.

E 10. (ASIIN 1.3, 3.2 and D6) It is recommended to increase the support for students receiving scholarships and grants. This could include training and support in writing research proposals.

E 11. (ASIIN 3.1) It is recommended to increase the number of visiting lecturers.

E 12. (ASIIN 4.3) It is recommended to redesign the webpage to make it user-friendly for people from outside, especially all information presented in English.

Recommendations
For the Master program Mathematics Education and Master program Science Education

E 13. (ASIIN 1.3) It is recommended to prolong the duration of the internships.

Recommendations
For the PhD program Mathematics Education and Science Education

E 15. (ASIIN 1.4) It is recommended to increase the English score for admission.

Technical Committee 12 – Mathematics (06.12.2024)

Assessment and analysis for the award of the ASIIN seal:

The Technical Committee supports the issued requirement; in addition, it discusses the recommendations. In particular, the intention and wording of the recommendation E11 is in its focus. The Technical Committee decides to delete the word “research” to distinguish between research proposals and proposals for students’ scholarships. It follows the suggestions with the experts with no further changes.

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
Ma Mathematics Education	With requirements for one year	30.09.2029	–	-
PhD Mathematics Education	With requirements for one year	30.09.2029	–	-

Requirements
For all study programs

A 1. (ASIIN 4.1) Improve the module handbooks regarding module descriptions, titles, assessment methods, literature. Each module requires a separate module description. Each module handbook should start with an overview.

Recommendations
For all study programs

E 1. (ASIIN 1.1, 1.3 & 5) It is recommended to systematically collect feedback from partners from industry, education, etc. to improve the study programs and the curriculum.

E 2. (ASIIN 1.1) It is recommended to diversify the type of external stakeholders and involve organizations/companies outside of education.

E 3. (ASIIN 1.3) It is recommended to increase the students' English proficiency by including a higher amount of English conversation in the classroom or organizing courses fully in English.

E 4. (ASIIN 1.3) It is recommended to improve the communication skills of the students, including competences to talk to parents and other stakeholders.

E 5. (ASIIN 1.3) It is recommended to increase the student mobility (especially in the master's programs).

E 6. (ASIIN 1.4) It is recommended to increase the number of international students in the study programs.

E 7. (ASIIN 1.6) It is recommended to diversify the teaching methods and offer alternatives to problem-based, case-based and project-based learning.

E 8. (ASIIN 3.1) It is recommended to increase the support for the lecturers to acquire international grants.

E 9. (ASIIN 3.1) It is recommended to increase staff mobility at university inside Indonesia and abroad.

E 10. (ASIIN 3.1) It is recommended to increase the number of visiting lecturers.

E 11. (ASIIN 1.3, 3.2 and D6) It is recommended to increase the support for students receiving scholarships and grants. This could include training and support in writing proposals.

E 12. (ASIIN 4.3) It is recommended to redesign the webpage to make it user-friendly for people from outside, especially all information presented in English.

Recommendations
For the Master program Mathematics Education and Master program Science Education

E 13. (ASIIN 1.3) It is recommended to prolong the duration of the internships.

Recommendations
For the PhD program Mathematics Education

E 14. (ASIIN D4) It is recommended to implement regular meetings between the students and their supervisors (if possible, in person).

Recommendations
For the PhD program Mathematics Education and Science Education

E 15. (ASIIN 1.4) It is recommended to increase the English score for admission.

I Decision of the Accreditation Commission (22.03.2023)

Assessment and analysis for the award of the subject-specific ASIIN seal:

The Accreditation Commission discusses the procedure and decides on several changes based on the suggestions of the different involved Technical Committees. Regarding the recommendation E4, the Accreditation Commission suggestion of the Technical Committee 10 to define the addressed issue. It further reverses the order of the recommendations E10 and E11 as suggested by the Technical Committee 13. In addition, it adapts the changes by the Technical Committee 12 to delete "research" in the recommendation E10 to distinguish between scientific research proposals and proposals for funding by students.

The Accreditation Commission decides to award the following seals:

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

Requirements
For all study programs

A 1. (ASIIN 4.1) Improve the module handbooks regarding module descriptions, titles, assessment methods, literature. Each module requires a separate module description. Each module handbook should start with an overview.

Recommendations

For all study programs

E 1. (ASIIN 1.1, 1.3 & 5) It is recommended to systematically collect feedback from partners from industry, education, etc. to improve the study programs and the curriculum.

E 2. (ASIIN 1.1) It is recommended to diversify the type of external stakeholders and involve organizations/companies outside of education.

E 3. (ASIIN 1.3) It is recommended to increase the students' English proficiency by including a higher amount of English conversation in the classroom or organizing courses fully in English.

E 4. (ASIIN 1.3) It is recommended to improve the communication skills of the students, including competences to talk to pupils' parents and other stakeholders.

E 5. (ASIIN 1.3) It is recommended to increase the student mobility (especially in the master's programs).

E 6. (ASIIN 1.4) It is recommended to increase the number of international students in the study programs.

E 7. (ASIIN 1.6) It is recommended to diversify the teaching methods and offer alternatives to problem-based, case-based and project-based learning.

E 8. (ASIIN 3.1) It is recommended to increase the support for the lecturers to acquire international grants.

E 9. (ASIIN 3.1) It is recommended to increase staff mobility at university inside Indonesia and abroad.

E 10. (ASIIN 1.3, 3.2 and D6) It is recommended to increase the support for students receiving scholarships and grants. This could include training and support in writing proposals.

E 11. (ASIIN 3.1) It is recommended to increase the number of visiting lecturers.

E 12. (ASIIN 4.3) It is recommended to redesign the webpage to make it user-friendly for people from outside, especially all information presented in English.

Recommendations
For the Master program Mathematics Education and Master program Science Education

E 13. (ASIIN 1.3) It is recommended to prolong the duration of the internships.

Recommendations
For the PhD program Mathematics Education

E 14. (ASIIN D4) It is recommended to implement regular meetings between the students and their supervisors (if possible, in person).

Recommendations
For the PhD program Mathematics Education and Science Education

E 15. (ASIIN 1.4) It is recommended to increase the English score for admission.

Appendix: Programme Learning Outcomes and Curricula

According to self-assessment report, the following **Program Educational Objectives (PEOs)** and **Program Learning Outcomes (PLOs; intended qualifications profile)** shall be achieved by the master study program *Mathematics Education*

PEOs:

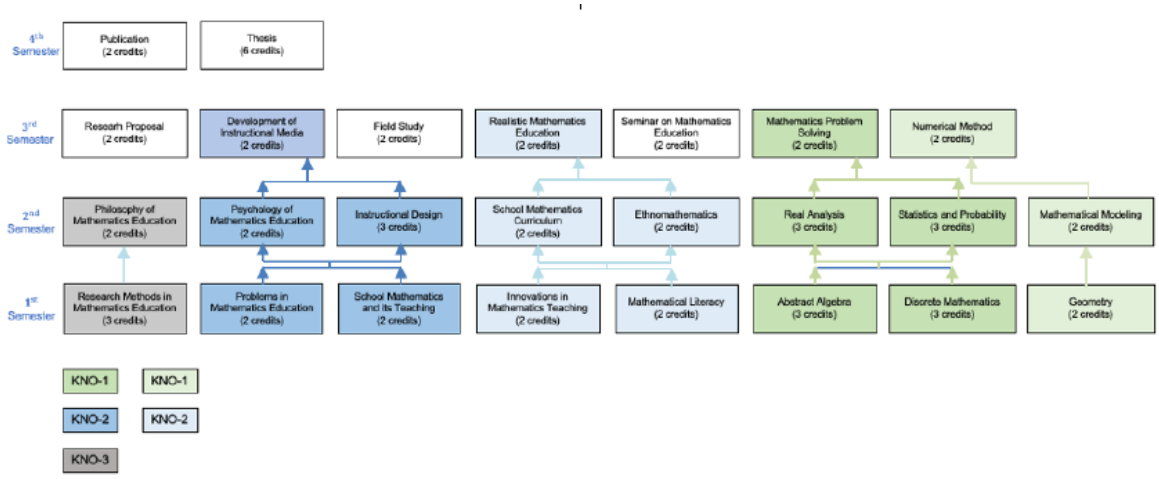
1. Able to use their knowledge and skills to solve mathematics education problems with an inter- and multidisciplinary approach.
2. Develop themselves through further studies, research, and professional activities both at national and international levels.
3. Have professional and ethical responsibilities in carrying out their duties and works.

PLOs:

Aspect	PLO	Code
Knowledge	1. Able to demonstrate mathematics knowledge and understanding	KNO-1
	2. Able to demonstrate mathematics pedagogical content knowledge and understanding	KNO-2
	3. Able to demonstrate knowledge and under-standing of mathematics education research	KNO-3
Skill	4. Able to use mathematical ideas to solve mathematics problems	SKI-1
	5. Able to design, implement, and evaluate an effective and innovative mathematics instruction	SKI-2
	6. Able to design, implement, and critically evaluate contemporary mathematics education research	SKI-3
Competency	7. Able to work on and present problems in mathematics and mathematics education	COM-1

	8. Able to work independently on a complex problem in mathematics and mathematics education, present and scientifically discuss the results both orally and in writing	COM-2
Attitude and Social	9. Collaborate and be responsible professionally and ethically in completing mathematics and mathematics education tasks	SOC-1

The following **curriculum** is presented:



According to self-assessment report, the following **Program Educational Objectives (PEOs)** and **Program Learning Outcomes (PLOs; intended qualifications profile)** shall be achieved by the doctoral study program *Mathematics Education*

PEOs:

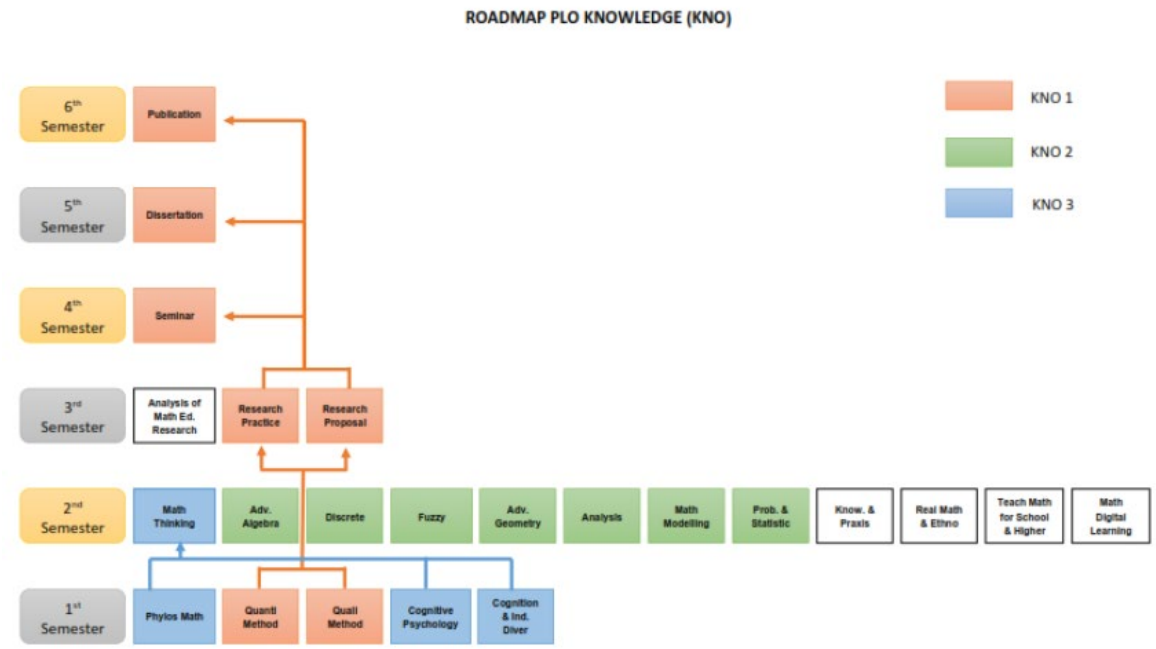
1. Able to develop knowledge of mathematics education that is related to technology and professional practice creatively.
2. Able to solve mathematics education problems by using transdisciplinary approach in national and international level.
3. Having professional responsibility and academic ethics to manage the given task.

PLOs:

Aspect	PLO	Code

Knowledge	1. Able to master the paradigm of thinking in the philosophy of mathematics and education mathematics, the relationship between the two in science, and concepts cognitive psychology, as well as other concepts developed to solve problems mathematics education.	KNO-1
	2. Able to master advanced mathematical concepts.	KNO-2
	3. Able to master the theory and research related to pedagogical principles in mathematics education that is original, creative, and innovative through research.	KNO-3
Skill	4. Able to find new scientific ideas in mathematics education through interdisciplinary, multidisciplinary, or trans-disciplinary approaches.	SKI-1
	5. Able to solve educational problem through integrative studies in life, culture, pedagogy, mathematics, and technology, and information.	SKI-2
	6. Able to carry out research and development of mathematics education beneficial to the public interest.	SKI-3
Competency	7. Able to make decision based on data and communicate research ideas, results and its argumentation written and oral.	COM-1
Attitude and Social	8. Able to demonstrate national culture values as well as ethics academics in carrying out their professional duties.	SOC-1
	9. Able to demonstrate scientific, critical, creative, and innovative attitude in developing mathematics education.	SOC-2

The following **curriculum** is presented:



According to self-assessment report, the following **Program Educational Objectives (PEOs)** and **Program Learning Outcomes (PLOs; intended qualifications profile)** shall be achieved by the master study program *Science Education*

PEOs:

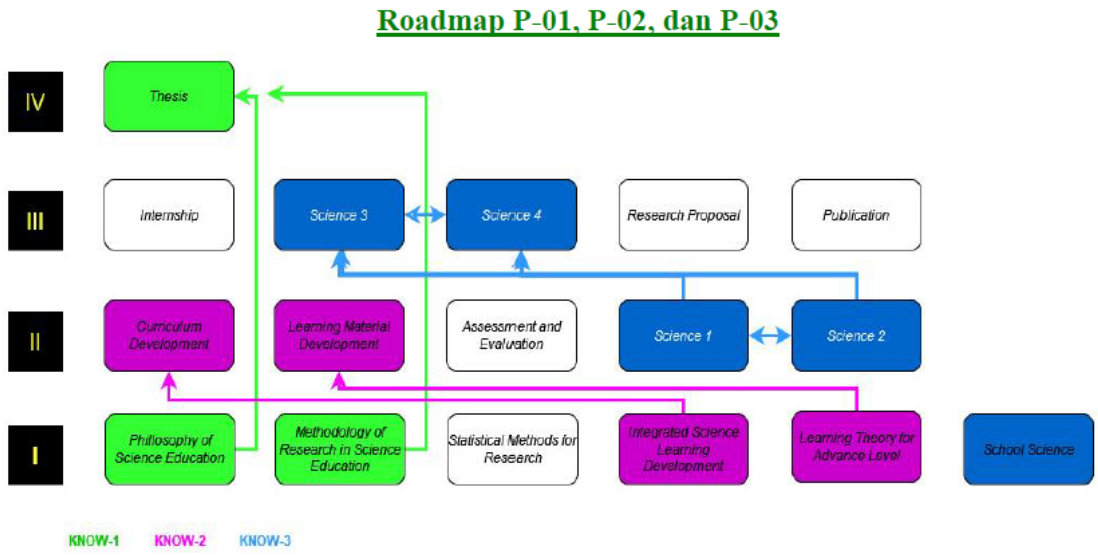
1. Able to manage and develop science educational research to solve science educational problem through multi and interdisciplinary approaches.
2. Able to develop TPACK (Technology, Pedagogy, Content Knowledge)-based on science learning materials.
3. Able to build mutually beneficial cooperation networks in science education in local, national, and international scope.
4. As an individual who has a professional ethics and character.
5. Able to develop themselves continuously and sustainably through education, training, and/or other self-development activities both formal and informal.

PLOs:

Aspect	PLO	Code

Knowledge	1. Mastering the philosophy of science education as a basis for thinking in developing superior innovations in science education.	KNO-1
	2. Mastering knowledge and technology in science education supported by the latest IT.	KNO-2
	3. Mastering the theory of pedagogy and andragogy science education and able to package science learning through the TPACK (Technological, Pedagogical, and Content Knowledge) framework.	KNO-3
Skill	4. Able to develop logical, critical, systematic, and creative thinking in the field of science through scientific studies and compiling scientific conceptions and studies based on scientific principles, procedures, and ethics in the form of a thesis.	SKI-1
	5. Able to solve science education problems with a multi and interdisciplinary approach through development research methodologies based on current issues.	SKI-2
	6. Manage, develop, and maintain network to improve self-capacity in local, national, and international scope.	SKI-3
Competency	7. Design, implement, and evaluate the science education curriculum to develop more effective learning innovations.	COM-1
	8. Design and develop innovative learning materials (lesson plan, teaching materials, student work sheet, media, and/or assessment instruments) to solve learning problems and improve the quality of scientific learning.	COM-2
	9. Designing and creating a conducive scientific learning environment to carry out active learning and reflecting to determine its effectiveness.	COM-3
Attitude and Social	10. Have honest, independent, caring, tough, and leadership-minded attitude/character	SOC-1
	11. Have the ability to develop themselves continuously.	SOC-2

The following **curriculum** is presented:



According to self-assessment report, the following Pr**ogram Educational Objectives (PEOs)** and **Program Learning Outcomes (PLOs; intended qualifications profile)** shall be achieved by the doctoral study program *Science Education*:

PEOs:

According to its self-assessment report, UNESA has issued the following PEOs for the doctoral program *Science Education* (DPSE):

1. Able to collaborate and apply professional ethics in carrying out their duties and work.
2. Able to develop themselves in a sustainable manner, as well as being a reference for related professions.
3. Able to develop knowledge for problem solving in the field of science education in an inter-disciplinary, multidisciplinary, and transdisciplinary manner and support career development.
4. Able to carry out publications as a means of scientific communication both orally and in writing in professional activities at the national and international levels.

PLOs:

Aspect	PLO	Code
Knowledge	1. Able to master the philosophy of science education to develop and update the science education.	KNO-1

	2. Able to master the latest theories related to science knowledge and science education.	KNO-2
Skill	3. Able to develop theories or methods in the field of science education and their linkages with theories in other fields comprehensively and contextually, through innovative research with interdisciplinary, multidisciplinary, or transdisciplinary approaches that have national or international recognition.	SKI-1
	4. Able to solve science education problems in a wider context so as to produce creative, original, tested works that are beneficial for the development of science education and the benefit of mankind.	SKI-2
Competency	5. Able to lead and manage interdisciplinary, multidisciplinary and transdisciplinary research to produce innovation and development of science education.	COM-1
	6. Able to compose scientific arguments and solutions based on a critical view of facts, concepts, principles, or theories that can be scientifically and ethically justified, and communicate them through scientific publications in reputable international journals.	COM-2
Attitude and Social	7. Internalizing scientific attitudes and behavior to contribute to improving the quality of life.	SOC-1
	8. Collaborate and apply professional ethics in carrying out their professional duties.	SOC-2

The following **curriculum** is presented:

0 Appendix: Programme Learning Outcomes and Curricula