ASIIN Seal

Accreditation Report

Bachelor's Degree Programmes
Mathematics Education
Mathematics
Computer Science Education
Computer Science

Provided by
Universitas Pendidikan Indonesia

Version: 24.03.2023

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]
Pendidikan Matematika	Mathematics Education	ASIIN	-	12
Matematika	Mathematics	ASIIN	-	12
Pendidikan Ilmu Komputer	Computer Science Education	ASIIN	-	4
Ilmu Komputer	Computer Science	ASIIN	-	4
Date of the contract: 07.-09.12.2021 **Submission of the final version of the self-assessment report:** 27.10.2021 **Date of the online visit:** 07.-09.12.2021				
Peer panel: Prof. Heribert Vollmer, University of Hannover Prof. Volker Bach, Brunswick Technical University Prof. Andreas Schwill, University of Potsdam Alexandra Dreiseidler, Emil-Fischer Gymnasium Euskirchen Luthfia Hastifa Sam, student representative, Universitas Hasanuddin				
Representative of the ASIIN headquarter: Tanja Kreetz				
Responsible decision-making committee: Accreditation Commission				

[1] ASIIN Seal for degree programmes

[2] TC: Technical Committee for the following subject areas: TC 04 - Informatics/Computer Science; TC 12 - Mathematics.

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 12 – Mathematics as of December 9, 2016 Subject-Specific Criteria of Technical Committee 04 – Informatics/Computer Science as of March 29, 2018	

B Characteristics of the Degree Programme

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
Mathematic Education	S.Pd (Bachelor of Education in Mathematics)	-	6	Full time	-	8 semesters	145 SKS (equivalent to 234 ECTS)	Once per year (in August)
Mathematics	S.Mat (Bachelor in Mathematics)	Algebra; Applied mathematics; Analysis; Statistics	6	Full time	-	8 semesters	146 SKS (equivalent to 235 ECTS)	Once per year (in August)
Computer Science Education	S.Pd (Bachelor of Education in Computer Science)	-	6	Full time	-	8 semesters	146 SKS (equivalent to 235 ECTS)	Once per year (in August)
Computer Science	S.Kom (Bachelor in Computer Science)	Robotics, artificial intelligence & Internet of things; Multimedia & design; Big data analysis	6	Full time	-	8 semesters	146 SKS (equivalent to 235 ECTS)	Once per year (in August)

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

For the Bachelor's degree programme Mathematics Education the institution has presented the following profile on the website:

"**Vision:**

The Study Program of Mathematics Education as a pioneer and excellent study program in mathematics education at the national label has received international recognition.

Mission:

1. Prepare aspiring educators and mathematics education personnel who excel, creative, superior, professional, and globally competitive;
2. Develop innovative and cutting-edge research in the field of mathematics education as the basis of the process of education and community service;
3. Develop community service based on mathematics education research results;
4. Develop the internationalization of mathematics education through strengthening networks and partnerships at the national and international levels;
5. Empower all resources owned by utilizing information and communication technology (ICT) engineering."

For the Bachelor's degree programme Mathematics the institution has presented the following profile on the website:

"**Vision:**

Mathematics Study Program as one of the Pioneer and Superior study programs in Mathematics

Mission

1. Organizing education to prepare prospective Mathematicians who are outstanding, creative, superior, professional, and globally competitive;
2. Researching the field of Mathematics as the basis for the education process and community service;
3. Organizing community service services based on research results in the field of Mathematics;
4. Organizing the internationalization of education and research through the development and strengthening of networks and partnerships at the national, regional, and international levels;
5. Empower all available resources by utilizing Information and Communication Technology (ICT) engineering in learning and research."

For the Bachelor's degree programme Computer Science Education the institution has presented the following profile on the website:

"**Vision:**

Become leading and outstanding study program in the field of Computer Science Education at the national level and recognized at the ASEAN level

Mission:

1. Organizing education by fostering and developing computer science education disciplines.
2. Conducting research to create and develop theories and products in the field of computer science education.
3. Disseminate experiences and innovative findings in computer science education for the betterment of society through the Community Service (PPM) program.
4. Strive for recognition of the Tridharma of Higher Education in the field of computer science education through the development and strengthening of networks and partnerships at the National and ASEAN levels.
5. Provide graduates in the field of computer science education who are faithful, devoted, professional, highly competent and with national insight who have attitudes and life ethics in accordance with religious norms and state law.
6. Provide educational products to develop science in the field of computer science education in the research carried out.
7. Carry out innovative developments in the field of computer science education and solve problems in the field of computer science education in the community to support national development.
8. Consummate cooperation and partnerships with external parties at the National and ASEAN levels."

For the Bachelor's degree programme Computer Science the institution has presented the following profile on the departmental Website:

"**Vision:**

Become a leading and outstanding study program in the field of Computer Science at the National level and contribute to the ASEAN level.

Mission:

1. Organize quality and professional education and develop computer science disciplines according to stakeholder demands.

2. Perform innovative and creative research by considering the following aspect as local wisdom, cross-fertilization with education, and multidisciplinary to contribute at the ASEAN level.
3. Disseminate and apply the experience and results of innovative and creative research in computer science for the benefit of stakeholders."

Organize the governance of study program, perform strength of networks and create partnerships with professional institutions and general institutions, as well as improve the quality of human resources that are globally competitive within the scope of National and ASEAN."

C Peer Report for the ASIIN Seal

1. The Degree Programme: Concept, content & implementation

Criterion 1.1 Objectives and learning outcomes of a degree programme (intended qualifications profile)

Evidence:

- Self-Assessment Report
- Study plans of the degree programmes
- Module descriptions
- Webpage BA Mathematics Education and Mathematics: https://home.matematika.upi.edu/
- Webpage BA Computer Science Education and Computer Science: https://cs.upi.edu/v2/

Preliminary assessment and analysis of the peers:
Universitas Pendidikan Indonesia (UPI) has described and published programme educational objectives (PEO) and intended programme learning outcomes (PLO) for each of the four degree programmes. While the PEO are developed based on the vision and mission of the university as well as the respective faculty and department and are rather general, the PLO describe in greater detail the abilities and competencies, which the students should acquire during their studies. The PEO and PLO are contained in the descriptions of the profiles of the degree programmes and are published on the website of the respective department, both in Indonesian and in English. They are well-anchored and accessible for all students and stakeholders.

The peers refer to the Subject-Specific Criteria (SSC) of the Technical Committees for Informatics/Computer Science and Mathematics respectively as a basis for judging whether the intended learning outcomes of the Bachelor's degree programmes Mathematics Education, Mathematics, Computer Science Education and Computer Science, as defined by UPI, correspond to the competencies as outlined by the SSC. They come to the following conclusions:

Graduates of the Bachelor's degree programme Mathematics Education should understand the main theoretical concepts and principals in Mathematics, master techniques of planning, implementing and evaluating mathematics teaching and learning and apply didactic and pedagogic concepts. They should be able to conduct research in mathematics education and determine alternative solutions based on experience and relevant research results. Furthermore, they should be able to master planning and organising various resources to support the implementation of the activities related to the personal development as mathematics educators, be engaged in further study or training in the sense of lifelong learning. They should also be able to use relevant information and communication technology (ICT) to improve the quality of mathematics teaching and learning. Moreover, graduates should be able to provide guidance and counselling services to solve student learning problems and improve the quality of teaching and learning in order to enable students to reach their learning outcomes. With such a broad occupational profile, graduates are qualified for a position as educators, teachers, trainers, research assistants and entrepreneurs, particularly in the field of mathematics education. According to the results of an alumni survey provided with the SAR, the majority of graduates (75.7%) was employed in accordance with the defined profile as mathematics educators (lecturers, junior high school teachers, high school teachers, and private tutors). Graduates also worked as research assistants (6.8%) and entrepreneurs (17.6%).

Graduates of the Bachelor's degree programme Mathematics are expected to understand the main theoretical concepts and principles in Mathematics and should be able to use these in order to solve simple practical problems in various fields by applying mathematical methods. Moreover, they should be able to conduct basic research based on general scientific methods and on the capability to present and solve mathematical problems both orally and in writing. The programme is designed as a general mathematics programme with some specialisation during the student's final thesis. The graduates are expected to have acquired skills relevant in a wide spectrum of occupations. Graduates of the Mathematics programme have different job opportunities, they can work in private or governmental institutions, can become entrepreneurs or continue their studies in Indonesia or overseas. In most cases of the alumni survey, the knowledge fields covered in the study programmes match the working fields of the graduates (for 76%). Graduates worked as academics (31%), consultants (25%), entrepreneurs (12%) and practioners (23%). 9% of the alumni continued their studies after they graduated. The Tracer Study Data indicate that a large majority (87%) of the respondents found work in the first six months after graduation, about half of them even in the first three months.

Graduates of the Bachelor's degree programme Computer Science Education are expected to be able to solve computer science problems using computational mathematics approaches and algorithms. They should be able to apply logical, critical, systematic and innovative thinking in the context of the development or implementation of science and technology, based on humanitarian and scientific values and ethnics in computer science education. Moreover, graduates are expected to creatively and innovatively apply pedagogic science in accordance with the educational requirements of students and learning scenarios. With such a broad occupational profile graduates are qualified to work as educators, teachers, trainers and educational facilitators, as computer science practioners (e.g. programmers, software engineers, network engineers, multimedia designers) and entrepreneurs, using their knowledge in the field of computer science. This is in correspondence with the alumni survey which shows that many students worked in schools, research institutes or public administration. The majority of graduates worked as educators. Apart from that, there are some who pursued careers as programmers (10%) and in computer administration (3%). Some were entrepreneurs ("Edupreneurs"), laboratory assistants, or worked in research. The alumni survey also shows that the average waiting time for alumni to get their first job is 2.13 months, with 34% of the graduates starting to work even immediately after graduation.

Graduates of the Bachelor's programme Computer Science are expected to master theoretical concepts related to computing, algorithms and programming including specialisation in the field of software engineering, artificial intelligence, multimedia, computer networks, data analysis and information systems in accordance with the dynamics of technological development. Furthermore, they should have the ability to effectively use computer hardware and software, be able to conduct research in the field of information technology based on humanitarian and ethical values and approaches. With such a competence portfolio, graduates are expected to be able to efficiently solve problems in society, industry, government and other institutions. The Tracer Study Data provided with the SAR demonstrates that for most respondents the own occupation matches the competencies acquired during their studies. Most of the them (68%) worked as practioners in software engineering, as programmers, network engineers, database administrators, multimedia designers or automation technicians; others worked as academics (8%), consultants (6.5%), researchers (2%) and entrepreneurs (1.5%). The average waiting time to obtain the first job upon graduation was 2.4 months. In fact 78% of the alumni started working within the first three months, and 32% did so immediately after graduation.

The reviewers gain the impression that the objectives and intended learning outcomes of all degree programmes under review are reasonable and well-founded and that there is a process in place to regularly update the intended learning outcomes.

During the audit, the alumni and external stakeholders express their satisfaction with the relevant knowledge, skills and competencies they acquired during their Bachelor's studies and the relevance of the graduates' profile and experience on the labour market. They confirm that employability is high and the respective degree programme appropriately qualifies students to find a relevant position in a comparatively short period of time. Students also are adequately qualified to move on with their studies in order to obtain a post-graduate degree.

The peers conclude that the objectives and intended learning outcomes of the four degree programmes are reasonable, well-founded and regularly updated. They are in correspondence with the respective ASIIN Subject-Specific-Criteria (SSC) of the Technical Committees for Mathematics and Informatics/Computer Science and adequately reflect the intended level of academic qualification aimed for. The degree programmes duly prepare students to take up a relevant occupation in correspondence to their qualifications acquired during their studies in a relatively short period of time.

Criterion 1.2 Name of the degree programme

Evidence:

- Self-Assessment Report
- Certificates and Diploma Supplements
- Standard Operational Procedures
- Website

Preliminary assessment and analysis of the peers:
The auditors confirm that the English translation and the original Indonesian names of the four degree programmes under review correspond with the intended aims and learning outcomes as well as the main course language (Indonesian). They mention that it may be worth considering for UPI to rename the two degree programmes Bachelor in Mathematics and Bachelor in Computer Science in "Bachelor of Science". According to the peers this would add value to the titles which would meet the expectations of HEI and stakeholders related to the objectives and intended learning outcomes of the programmes.

Criterion 1.3 Curriculum

Evidence:

- Self-Assessment Report
- Study plans of the degree programmes
- Module descriptions

- Webpage Ba Computer Science Education: https://cs.upi.edu/v2/pendilkom/kurikulum
- Webpage Ba Computer Science: https://cs.upi.edu/v2/ilkom/kurikulum
- Webpage Ba Mathematics Education: https://home.matematika.upi.edu/math-ed-curriculum-structure/
- Webpage Ba Mathematics: https://home.matematika.upi.edu/mathematics-structure-curriculum/

Preliminary assessment and analysis of the peers:
All undergraduate programmes at UPI are designed to be completed in eight semesters or four academic years with a maximum of 14 semesters or seven academic years. Each semester is equivalent to 16 weeks of learning activities. As an integral part of these learning activities, one week is devoted to mid-term exams (week 8) and one week to final exams (week 16).

In general, the curriculum structure of the undergraduate programme consists of the core curriculum, which aims to develop the main competencies of graduates, amounting to about 88% of the total credits to be taken by students, and the elective curriculum, which aims to broaden the main competencies and amounts to about 12% of the credits. In detail, the curriculum structures of the undergraduate programme are grouped into General Courses (MKU), Basic Education Courses (MKDK), Faculty Expertise Courses (MKKF, 6 SKS), Field of Study Learning Courses (MKKPBS), University Specificity Courses (MKKU), Core Expertise Competencies Courses (MKIPS), Study Program Elective Expertise Courses (MKKPS) as well as internships (PPLSP and PPL, respectively).

The general courses (MKU) consist of compulsory courses such as religion, religion educational (these first two courses are taken by students according to their religion: Islam, Christianity, Catholicism, Buddhism, Confucianism, or Hinduism), Indonesian language, sports education, arts education, civic education and Pancasila education. The study load for these courses is 2 credits (SKS) each. The aim of these courses is to increase the students' understanding and practice of their respective religions, to develop the students' character in regard to nationality, culture, and love of their homeland as well as to maintain physical fitness.

University Specificity Course (MKKU) is a university expertise course ("Educational Foundation") that is taught to all non-educational students. This course is given to provide them with basic educational knowledge.

The basic education courses (MKDK) are a group of courses providing the students with the foundation for educational sciences, teaching and learning, educational management, and

educational psychology. Moreover, the courses provide knowledge of didactical methods of teaching and learning in the classroom. This group of courses is compulsory for students in education study programmes of UPI. This group of courses is not offered in the non-education programmes.

The faculty expertise courses (MKKF) is a group of courses that distinguishes FPMIPA UPI's students from students of other faculties. Courses offered here are courses in Mathematics, Science, Technology, and Engineering (MSTR), and in Mathematics, Science, Technology and Engineering Applications (AMSTR). Both courses apply the Science, Technology, Engineering, Art, and Mathematics (STEAM) concept in the teaching and learning process. In these two courses, the students acquire competencies such as developing literacy in mathematics, science, technology, and engineering, solving problems that exist in everyday life in a critical, creative, integrative and multidisciplinary manner through collaboration within teams with an emphasis on communicating actively and making decisions efficient by taking into account local, regional and global challenges, and forming a caring and tolerant attitude towards social, economic, and environmental issues in order to realize Education for Sustainable Development (ESD) and the Sustainable Development Goals (SDGs).

The field of study learning courses (MKKPBS) then is a group of courses that offer students knowledge and skills related to teaching and learning planning, teaching and learning strategies, the use of media and learning aids, and teaching and learning evaluation supported by ICT literacy courses.

The core expertise competency courses (MKIPS) and the study programme elective expertise courses (MKKPPS) are two groups of courses consisting of particular courses that represent the characteristics of each study programme. MKKPPS is a group of courses that expand students' abilities by studying the implementation of science and technology, paying attention to and applying scientific procedures and ethics to produce solutions, ideas, designs, and by enabling them to compile scientific descriptions of the results of their studies in the form of a published report/paper.

The Internship programme in the education study programmes is called PPLSP. It is developed in the form of real teaching with a block system and is placed in both odd and even semesters. PPLSP focuses on reflective models through supervision not on microteaching as implemented in learning simulation activities. PPLSP aims at making the graduates of educational study programs master the knowledge, skills, and attitudes related to education (pedagogical knowledge and pedagogical content knowledge). In non-education study programmes, the Internship programme is called PPL. Students of non-education study programmes are given the opportunity to do an internship of one semester in governmen-

tal organisation or private companies. Such internship provide students with the opportunity to implement their knowledge or skills acquired at UPI and to gain new practice-oriented experiences.

The following table was presented in the SAR of UPI and presents the number of SKS and the respective share among the total number of credits in the four degree programme.

No	Courses Category	Mathematics Ed		Mathematics		Computer Science Ed		Computer Science	
		Credits	Percent (%)	Credit	Percent (%)	Credit	Percent (%)	Credit	Percent (%)
I.	General Courses (MKU)	14	9,7	14	9,6	14	9,5	14	9,6
II.	Basic Education Courses (MKDK)	8	5,5	0	0	8	5,4	0	0
III.	Faculty Expertise Courses (MKKF)	6	4,1	6	4,1	6	4,1	6	4,1
IV.	University Specificity Course	0	0	2	1,4	0	0	2	1,4
	Field of Study Learning Expertise Courses (MKPBS)	12	8,2	0	0	12	8,2	0	0
V.	The Core of Study Program Courses (MKIPS)	86	59,3	102	69,9	84	57,5	102	69,9
VI.	Study Program Elective Expertise Courses (MKPPS)	15	10,3	18	12,3	18	12,3	18	12,3
VII.	The Internship Course (PLSP/PPL)	4	2,8	4	2,7	4	2,7	4	2,7
	TOTAL	145		146		146		146	

In the Bachelor's degree programme Mathematics Education courses students are meant to learn how to teach mathematics, identify, and to apply suitable didactical approaches and teaching methods. Students also acquire necessary basic knowledge and abilities in the different areas of mathematics, for instance algebra, calculus, geometry and numerical methods. Furthermore, students acquire competencies in programming. Through the choice of elective modules, they can deepen their knowledge in teaching and learning in the fields of geometry and analysis, contemporary mathematics, statistics and probability or number theory and algebra.

In the Bachelor's degree programme Mathematics, the courses are designed for students to acquire necessary basic knowledge and abilities in the different areas of mathematics such as algebra, calculus, geometry and numerical methods. Furthermore, students acquire competencies in programming. Through the choice of elective modules, students can deepen their knowledge and specialise in the fields of algebra, applied mathematics, analysis or statistics.

In the Bachelor's degree programme Computer Science Education, the courses enable students to learn how to teach computer science, they acquire learning strategies, learn how to apply suitable didactical approaches and teaching methods. They also acquire necessary basic knowledge and abilities in the different areas of computer science, for science and technology, technology and information, algorithm and programming, programming, data system and computer network. Furthermore, students acquire competencies in programming. Through the choice of elective modules, they can deepen their knowledge in robotics, artificial intelligence & Internet of things, multimedia & design or Big data analysis.

The peers agree that the curricula of all four programmes are generally suitable to achieve the intended learning outcomes as defined by UPI. They cover important areas of the respective subject and allow the students to select fields of specialisation in accordance with their interests and abilities, both in the subject areas as well as on a broader level related to personality development (e.g. through internships, community services, study abroad).

The peers learn that during the Bachelor's degree programmes in Mathematics Education and Computer Science Education students gain general subject-specific knowledge in teaching and learning in schools. They can focus on, and specialise on, the level of schools aimed at (junior, senior high school or vocational school) not already in the context of their degree programme but through upgrading courses offered by training centres or the city/region and sometimes also by UPI. Graduates who wish to become an in-service teacher paid by the government must enrol in a fee-based and student-paid one-year professional teacher education programme offered by a teacher training centre. Students of such programmes take courses on didactics and pedagogy and learn how to produce learning materials specifically designed for the subject and the school level aimed at. According to the peers, the two educational programmes would benefit from introducing school-type and school-level specific specialisation courses for the three school types in question. They recommend that UPI should increase the number of electives in Mathematics Education and Computer Science Education and should offer specific courses for teaching Mathematics and Computer Science respectively, particularly for the upper high school level and for vocational schools, for which currently there is a lack of targeted courses offered.

The peers observe that the curriculum of Computer Science offers many courses and six fields of specialisation which qualify the students for relevant jobs. They suggest that integrating additional courses that explicitly cover application fields in computer science e.g. in the areas of business, maths, the industry, science, engineering, and administration would enable students to gain relevant transferable skills and competencies required in the labour market. This would be beneficial for the employability of the students after they graduate.

The peers learn that students of the Mathematics Education degree programme taking the module "ICT literacy and mathematics learning media" are informed about the type of digital learning media and software used in the introductory session at the beginning of the semester. The peers stress that transparency is very important and conclude that the module description in its current shape is not sufficiently concrete in terms of the learning methods and software applied. It leaves, however, UPI's teaching staff sufficient freedom to select the most suitable teaching and learning methods and software during a selected course. For that reason they consider the current information generic but acceptable.

The peers learn that according to the academic guidelines of UPI there are two tracks students can follow, the so-called undergraduate thesis track and the non-thesis track, both enabling students to complete their studies and graduate.

Students in the four study programmes are eligible for the thesis track if they have passed undergraduate courses, achieved at least 105 SKS with a GPA of at least 2.50 and have a recommendation from an academic supervisor. In this case, the students formally apply for working on the suggested topic. The peers appreciate that in many cases the internship and the thesis work can be combined and that aligning both is actively encouraged by UPI, a hands-on and practice-oriented focus of the student's thesis is thus promoted.

Students who have achieved at least 105 SKS but have a GPA of only around 2.00 – 2.49 must take the non-thesis track in which case they take thesis substitute courses provided by the department or study programme, and conduct an essay or final assignment. The peers understand that in theory these two tracks are possible and that the non-thesis track has been designed as an emergency path for UPI. However, the non-thesis track lacks a mechanism which ensures that students independently deal with a topic from the respective subject area, using sound scientific methodology at the Bachelor's degree level aimed for. UPI is therefore required to change the regulations so that the thesis track applies to all students who have accumulated enough credits for finalising their studies (please also see criterion 3 on exams).

During the discussion with the peers, UPI's partners from the industry/public sector confirm that the graduates have a relevant scientific education, are very creative, and have manifold competencies, which allows them to find adequate jobs. The employers mention, however, that it would be useful for the students to acquire more soft skills with respect to team work, communication, and presentations. This is most relevant for the Computer Science Education and Computer Science programmes. The peers support this point of view and suggest to incorporate soft skill training in the courses, for example by promoting presentation skills.

The peers conclude that the curricula of the four degree programmes are mostly plausibly structured and contribute to the overall objectives and intended learning outcomes. It is clearly communicated and transparent to students and stakeholders, which knowledge, skills and competencies students will acquire in each module and how the overall curriculum qualifies the students for relevant jobs or to pursue further education or university studies, especially in Indonesia and in other Asian countries. The educational programmes would benefit from school-type specific specialisation/elective courses to provide a specialised qualification for students aiming to become a teacher.

Based on the question how students are supported who wish to improve their English skills, the programme representatives indicate that there is a parallel track for some of the courses offered in Indonesian and in English. Apart from a limited number of English courses offered by the degree programmes, UPI informs students about publications in English, about exchange programmes, open calls and competitions as well as extracurricular activities (e.g. the English community, English club, engagement as a peer buddy for the envisaged increasing number of international students studying at UPI). The peers acknowledge the higher education policy that encourages HEI to have bilingual classes. The degree programmes under review benefit from this policy, e.g. through offering geometry courses in English. In the Mathematics and Computer Science programmes, students are supported when preparing for English language exams.

Criterion 1.4 Admission requirements

Evidence:

- Self-Assessment Report
- Academic Guidelines
- Decree of Minister of Research, Technology and Higher Education No. 2, 2015
- UPI webpages: https://home.matematika.upi.edu/, https://cs.upi.edu/v2/pendaftaran/nasional, http://dia.upi.edu/international-students/admission/
- Discussions during the audit

Preliminary assessment and analysis of the peers:
According to the Self-Assessment Report, the requirements, schedule, registration venue, and selection test are announced on UPI's webpage and thus accessible for all stakeholders. The new student admission rules for all Bachelor's degree and Diploma programmes are the same, and are conducted at university level.

The admission of new students at UPI is carried out by following the rules set by the Directorate General of Higher Education, the Ministry of Education and Culture as well as the applicable regulations at UPI through the following selection channels:

1) National Selection for State Universities (SNMPTN) is a channel of new students' admission held nationally for undergraduate education programs. The SNMPTN selection is carried out by means of academic achievements and portfolios (specifically for arts and sports) at the secondary education level (SMA, MA, SMK). Data processing and organizing are carried out by the Higher Education Entrance Test Institution (LTMPT, http://ltmpt.ac.id).

LTMPT is the only standard university test provider in Indonesia. Information regarding requirements, selection stages, registration procedures, and schedules, and capacity are available at https://pmb.upi.edu/sarjana/snmptn/.

2) Joint Selection for State Universities (SBMPTN) is a channel of new student's admission for undergraduate education programs carried out jointly with other state universities through Computer-Based Written Examinations (UTBK) and portfolios in arts and sports (specifically for arts and sports). This selection is held by LTMPT. Information regarding general provisions, prerequisites, and registration stages, portfolios on SBMPTN registration, UTBK fees, schedules, and capacity are available at https://pmb.upi.edu/sarjana/sbmptn/.

3) Independent Selection of Universitas Pendidikan Indonesia (SM UPI, available at https://pmb.upi.edu/sarjana/seleksi-mandiri/) held independently through the following channels:

a. UPI Independent Selection (SM UPI) is the selection to recruit new students of Diploma and Bachelor programme designed separately by UPI. Prospective students for the dual-mode programme and the Second Bachelor programme are specifically selected through a portfolio assessment.

b. The cooperation channel coordinated by the Directorate of Education together with the Business Management and Development Agency (BPPU) as the manager of the cooperation. The cooperation can be carried out with the central government and local governments, the terms and mechanisms for admitting prospective students are determined by a decision of the university's rectorate.

c. Special Achievement (PI UPI) channel to recruit prospective new undergraduate students designed separately by UPI. Selection through the PI UPI route aims to reward students who have special achievements shown through monumental works of art or technology or academic and non-academic achievements at national and international competitions of high public recognition. UPI PI pathway is designed to increase the competitive excellence and achievement of UPI students in the future at the national and international levels.

The number of student capacity in 2016 – 2021 of each study programme and the student capacity according to various selection channels can be seen in the table below. The annual intake of new students in the four programmes has been 90 students in the last two years. For the degree programmes in Mathematics, Computer Science Education and Computer Science the capacity has increased since 2018 and 2019, respectively.

Study Program	Capacity in 2016				Capacity in 2017				Capacity in 2018				Capacity in 2019				Capacity in 2020				Capacity in 2021			
	A	B	C	T	A	B	C	T	A	B	C	T	A	B	C	T	A	B	C	T	A	B	C	T
Mathematics Education	50	32	30	112	24	32	31	87	27	45	18	90	27	41	22	90	25	45	20	90	27	45	18	90
Mathematics	25	18	15	58	14	18	13	45	16	20	9	45	27	41	22	90	25	45	20	90	25	45	20	90
Computer Science Education	30	18	18	66	14	18	16	48	36	34	20	90	27	41	22	90	30	41	19	90	30	41	19	90
Computer Science	30	18	18	66	14	18	16	48	16	14	10	40	27	41	22	90	31	41	18	90	31	41	18	90

Description:

A: SNMPTN
B: SBMPTN
C: SM/ Special Achievements
T: Total

The table below shows that the ratio of applicants and admitted students was on average 1:21, 1:17, 1:11 and 1:35 for the four programmes over the last five years, respectively. The table also indicates that the trend of new student enrolment interest tends to decrease for other programs, due to an increase in capacity. The decision to increase the capacity was made by the university, due to the large number of applicants.

Study Program	Academic Fiscal Years	Registrant Number	Selected Number	Tightness Ratio
Math. Education	2016/2017	3.049	113	27
	2017/2018	2.567	90	29
	2018/2019	1477	100	15
	2019/2020	1469	98	15
	2020/2021	1566	92	17
Math	2016/2017	1.371	58	24
	2017/2018	1.307	51	26
	2018/2019	981	50	20
	2019/2020	1250	97	13
	2020/2021	1062	94	11
Comp. Science Education	2016/2017	956	56	17
	2017/2018	801	50	16
	2018/2019	1189	97	12
	2019/2020	800	95	8
	2020/2021	647	96	7
Comp. Science	2016/2017	2505	50	50
	2017/2018	2635	52	51
	2018/2019	2811	45	62
	2019/2020	1941	98	20
	2020/2021	2200	96	23

The peers consider the terms of admission to be binding, transparent and easily accessible. They confirm that the admission requirements adequately support the students in achieving the intended learning outcomes.

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

The peers understand that UPI has been obliged to re-name the title of the Bachelor degree programmes in Mathematics and Computer Science following a Rector Decree and Ministry Regulation in 2015. They recommend the departments to launch again a discussion on the titles and to argue for the titles "Bachelor of Science – Mathematics" and "Bachelor of Science – Computer Science" in order to add value and international recognition.

The reviewers welcome UPI's plan following their recommendation, to increase the number of electives in Mathematics Education and Computer Science Education and to provide more course offers particularly for the upper high school level and for vocational schools. They also appreciate that in the next curriculum revision UPI intends to introduce more application oriented courses in the Computer Science degree programme.

It is well noticed that UPI agrees with the requirement to make the thesis-track also in theory a mandatory part of the curriculum so that all students will have demonstrated they worked independently at the level aimed for at graduation.

The peers positively note that UPI appreciates the peers' suggestion to provide a more specialised qualification for students aiming to become a teacher (e.g. via school-type specific electives).

The peers conclude that they regard criterion 1 mainly fulfilled.

2. The degree programme: structures, methods and implementation

Criterion 2.1 Structure and modules

Evidence:

- Self-Assessment Report
- Study plans of the degree programmes
- Module descriptions
- Discussions during the audit

Preliminary assessment and analysis of the peers:

The curricula of the Bachelor's degree programmes are aligned with the national standards in Indonesia, which determine the minimum number of course credits and groups of

courses that must be offered. The study plans include theoretical and practical courses, thesis and thesis proposal, community service, electives and internships.

In the first two semesters of the Bachelor's programme Mathematics Education, students gain basic skills in Mathematics such as in calculus, geometry or number theory. They also take a statistics course and a subject-specific English course called "English for Mathematics". The third semester builds on, and further develops the knowledge gained. Moreover, students take courses in ICT Literacy and Mathematics Learning Media. From the fourth until the sixth semester, students take three courses each, and further deepen their mathematical knowledge and abilities. They also take modules in computer programming, statistics and computer mathematics programming. In the seventh semester the curriculum comprises two courses under this category (Data Processing, Numerical Methods). In the sixth as well as the seventh semester students also take as four and five optional knowledge and expertise courses, respectively. During the last semester students take an internship in education, write their undergraduate thesis and defend their thesis.

In the Mathematics programme, the expertise courses of the study programme (MKKIPS) comprise 102 SKS. Courses under this category are taken in all of the eight semesters of the study programme. Students must take four to five courses during the first, second and sixth semester and six to seven courses each semester from the third until the fifth semester. In the first two semesters students gain basic Mathematics knowledge (Basic Mathematics and Statistics, Differential Calculus, English for Mathematics, Number Theory, Integral Calculus, Linear Algebra, and Discrete Mathematics) and deepen their knowledge in the next semesters. The Elective Expertise Courses of Study Programme (MKKPPS) are categorised in the following groups: Statistics Expertise, Algebra Expertise, Analysis Expertise and Applied Expertise. Each course offered in this category amounts to the required 18 SKS.

In the Computer Science Education programme, the expertise courses of the study programme (MKKIPS) comprise 84 SKS. In the first semester students take three subject-specific courses (Introduction to Technology and Information, Computer Architecture and Organization, English), in the second semester four (Algorithm and Programming, Data Structure, Calculus, Statistics). The third and fourth semester is devoted to six such courses (Database System, Discrete Mathematics, Computational Thinking, Numerical Method, Capita Selecta, Ethics in Profession), while the fifth and sixth semester covers the courses Linear Algebra and Matrix, a seminar and a course on entrepreneurship under this course category. The last semester focuses on the undergraduate thesis and the thesis defence. Under the MKKIPS category students must select an Expertise Field Groups enabling a specialisation during the third and the sixth semester, comprising courses in Software Engineering (Software Engineering, Internet Programming, Object-Oriented Programming, Mobile Programming), Computer and Network Engineering (Electronics Circuit, Computer Network,

„Network Infrastructure & System Administration) as well as Multimedia and Design (Audio and Video Processing, Animation, Graphic Design). As noted earlier, the reviewers miss a tailoring of the curriculum to the later professional activity of the graduates. Depending on the field of activity in which the graduates of the teacher training programme will later work (especially in secondary education II), the students should also be familiarised with the theoretical foundations of computer science, especially with formal languages and automata theory, a module already provided in the computer science programme (IK260).

The Core Expertise Courses in the Computer Science study programme comprise 39 courses, each of two or three SKS, accumulating to 102 SKS. In the first two semesters students take fewer core expertise courses (four and six respectively) than in the third and fourth semester with seven courses under this category. In the sixth and seventh semester they take four of such courses. In the eight semester students write their undergraduate thesis and have their thesis defence. For their elective courses (MKKPS) students specialise on one of six areas of specialisation arranged in course packages (Professional Competencies, KBK), accumulating to 9 SKS (two to three SKS for each course). The six KBK are 1) Software Engineering, 2) Artificial Intelligence and IoT Robotics Control, 3) Multimedia and Design, 4) Computer Engineering and Network Systems, 5) Big Data Analysis, and 6) Information Systems.

During the online audit the peers are informed that elective courses are offered based on the student demand and to accommodate the students' study interests. Academic advisors support students with the course offer and how and which electives complement and deepen their studies. UPI does not have a specific regulation in terms of the minimum number of students required for an elective course to be offered. The peers understand that sometimes an elective course is not offered if there is only a very small number of students interested in that course.

They learn that UPI differentiates between the module "Thesis" and "Thesis Defence" in the four degree programmes, and understand that the differentiation is required for administrative and course registration reasons, e.g. to enable students to write their thesis in one semester and to defend it in the next semester.

In summary, the peers gain the impression that the choice of modules and the structure of the curriculum ensures that the intended learning outcomes of the respective degree programme can be achieved.

International Mobility

UPI provides opportunities for students to conduct internships and to participate in exchange programmes abroad. A list of available exchange and internship programmes that

students can participate can be found on the website. For example, UPI has international cooperation with more than 80 different universities and institutes, in countries such as Malaysia, Japan, Thailand, the Philippines, Australia, the UK, Germany, and the USA. Student exchange activities aim at enhancing students' international experience, expose students to different learning environment, contribute to enhanced intercultural as well as foreign language skills. The peers recognise and appreciate that the degree programmes under review made considerable efforts to reduce the number of compulsory courses between the fifth and the seventh semesters in order for students to spend some time outside of university, e.g. to go abroad without prolonging their studies.

The new policy of the Indonesian government actively supports students activities spent outside of the university by releasing a regulation on the Merdeka Belajar-Kampus Merdeka (MBKM), which requires the university to promote students who wish to leave their home university for parts of their Bachelor's study (Minister of Education and Culture Regulation Number 3 Year 2020). Through MBKM students have the opportunity for one semester or equivalent to 20 SKS of studying outside the study programme at the same university; and a maximum of two semesters or equivalent to 40 SKS of studying at a different university or learning outside of Higher Education e.g. by taking an internship. The peers acknowledge the so-called „Freedom of learning" programme as a way to stimulate creativity, personality development and organisational and social skills acquisition of students, as a result of collaborative learning, and intercultural and/or interdisciplinary education.

The students confirm during the discussion with the peers that some opportunities for international academic mobility exist, mostly with universities in Malaysia. They also point out, however, that they wish for a greater variety of places and better endowed scholarships for long and short-term stays abroad. The number of available places in the exchange programmes is still limited, and there are restrictions due to a lack of sufficient financial support. UPI can only provide limited travel grants, while the demand from students is increasing. The lack of financial support and in some reported cases insufficient English skills hinder some of the students from joining outgoing programmes.

The peers discuss with UPI's management if there is a strategic concept to increase the international mobility of students and teachers. They learn that UPI has many international partners and has established some double-degree programmes. The peers support these developments and measures, and recommend to UPI to increase its internationalisation efforts by establishing more international cooperations and exchange programmes, creating more places for students to study abroad and offering more and better endowed scholarships. To improve the situation, UPI could try to set bilateral arrangements with other HEIs abroad which enable study mobility and provide a scholarship.

The peers acknowledge that the rules for recognising achievements and competencies acquired outside UPI are transparent and binding. They render the transition between HEIs feasible and support the further internationalisation of UPI.

In summary, the peers appreciate UPI's efforts in fostering internationalisation and recommend to create further chances for academic mobility of students, by cooperating with additional renowned international universities. The peers encourage UPI to maintain the already existing and very successful collaborations with universities and institutions abroad, and to continue pursuing its path.

Criterion 2.2 Work load and credits

Evidence:

- Self-Assessment Report
- Study plans of the degree programmes
- Module descriptions
- Academic Guidelines
- Discussions during the audit

Preliminary assessment and analysis of the peers:

Based on the National Standards for Higher Education of Indonesia (SNPT), the four degree programmes use credit points called SKS, which are regulated as follows: One credit point comprises 170 minutes per semester week in total and is divided differently for lectures and tutorials and for seminars or other types of academic activities. For lectures and tutorials the total of 170 minutes is divided into 50 minutes of face-to-face (classroom) activities, 60 minutes of structured tasks and assignments, and 60 minutes of self-study. In seminars or other similar academic activities, they consist of 100 minutes of face-to-face activities as well as 70 minutes of independent activities per week. The SKS credit value is equivalent to 29 – 34 ECTS in each semester. Students regularly take 18 – 21 credits per semester, so there are 15 – 17.5 hours of work in the classroom each week, they spend 18 – 21 hours per week on structured assignments and devote 19 – 21 hours on self-study. This accumulates to 52 – 59.5 hours of work during each of the two 16-weeks lecture periods. If a student is not satisfied with a grade, she or he can repeat the classes, but this will lead to a prolongation of the study time. Students with higher academic achievements measured by the Semester Achievement Index (IPS) of the previous semester are eligible for taking more courses. Students with an IPS below 2.5 can take a maximum number of 16 credits (SKS), with an IPS between 2.5 and 4.00 up to 21 SKS, those ranging between 3.00 and 3.50 can take up to 23 SKS and with more than 3.5 are eligible to take a maximum number of 24 SKS.

Based on the assessment of the SAR and the audit discussion, the peers acknowledge that there is a credit point system in place which is appropriately devised for all courses, comprising both attendance-based and self-study. UPI is asked to clarify if time for taking exams is included in the estimation of the workload for its courses and if not, to ensure that its credit point system includes all compulsory elements of the programme.

The workload is an estimation of the average time spent by students to achieve the expected learning outcomes. The actual time spent by an individual student, may differ from this estimate, however, which is the reason that it is essential to obtain feedback from the students. The student survey UPI provided with its SAR demonstrates that the workload estimated by UPI indeed corresponds to the student experience and feedback about the average number of hours spent. In terms of the high weekly workload of the students, the peers acknowledge that there is no workload outside the 16 week lecture period and that UPI plans to increase the number of credits and decrease the number of courses in this respect, which should ultimately lead to a reduced workload. The peers appreciate that UPI supports students also on a 1:1 level to avoid peaks (see criterion 2.4 Support and assistance). The peers recommend for UPI to regularly monitor the student workload in order to be prepared to take mitigation actions whenever needed (see also criterion 6).

The peers observe that irrespective of the high workload, the vast majority of students manages to successfully finalise their studies in the regular programme duration. Correspondingly, the dropout and resigning rate of students in the four programmes of the years 2014-2017 were 9%, 6%, 6% and 11% respectively. The success rate was correspondingly 91%, 94%, 94% and 89% which is considered high according to international standards. Moreover, the average time to graduate for the last five years was 4.43 and 4.30 years, respectively for the Mathematics Education programme and the Mathematics programme. The average time to graduate in the Computer Science Education programme and the Computer Science programme was 4.76; and 4.79 years, respectively. The peers conclude that the majority of students manages to study in the regular duration of the programme and that there are no structural deficiencies.

The peers identify structure-related peaks in the workload as the work takes place in a condensed way during the lecture period, the students report, however, that they still have sufficient time for social and community related activities and that, as stated above, only few drop out or exceed the regular duration of the programmes.

The peers conclude that the credit point system is appropriately devised, comprising both attendance-based and self-study. They observe that the workload is high, but given the feedback during the audit and the statistics provided, it appears to be manageable. The

peers recommend to carefully and regularly monitor the student workload, in order for UPI to be able to take corrective actions whenever needed.

Criterion 2.3 Teaching methodology

Evidence:

- Self-Assessment Report
- Study plans of the degree programmes
- Module descriptions
- Discussions during the audit

Preliminary assessment and analysis of the peers:
Various teaching and learning methods are applied during face-to-face learning, online learning, assignments and projects, practicum in computer laboratory and/or learning laboratory, and/or practicum outside campus in the form of Internship Programme (PPLSP), Field Practice Programme (PPL), and Student Study Service (KKN). The concrete teaching methods and learning strategies are aligned with the course types and missions. Structured activities include tutorials, homework, assignments (reading or problem exercises) and practical activities. Group project assignments are given in some courses to develop students' skills in teamwork, communication, and leadership. The assignments and exercises should help students to develop their abilities with respect to critical thinking, written/oral communication, data acquisition, problem solving, and presentations. During the classes, active and interactive teaching methods (e.g. lectures, discussions, reports, presentations, and group work) are applied which contributes to the transition from a teacher-centred to a student-centred learning approach.

The most common method of learning is class session, with several courses having integrated laboratory practical exercises. Lecturers generally prepare presentations to aid the teaching process. With individual or group assignments, such as discussions, presentations, or written tasks, students are expected to improve their academic as well as their soft skills. In addition, practical activities during the practicums – mostly held outside campus during the Student Study Service Programmes and Internship Programmes – are designed to enable students to be acquainted with academic research methods, for a theory-practice alignment and for the acquisition of complementary skills. In the educational programmes the teaching internships are held in school classrooms where students are supervised by a teacher and a lecturer and have a duration of approximately one semester or at least 16 face-to-face meetings in the classroom.

Accordingly, there are a variety of teaching methods applied which are suitable for achieving the intended learning outcomes. The peers ask UPI to update its module handbooks to

specify – if possible only to a certain degree, in order to enable a flexible design of the courses e.g. able to apply new methods – or at least list exemplary teaching methods applied during each module (see also criterion 5). This will help students to get a clearer picture and better orientation about the courses they wish to take.

To help students achieve the intended learning outcomes and to facilitate adequate learning and teaching methods, UPI has developed an e-learning platform, where students and teachers interact.

The peers positively notice that UPI has thoroughly reflected on the implications of the COVID-19 pandemic in terms of teaching and learning models. UPI has successfully implemented the transition to online teaching and learning during the pandemic. The peers also acknowledge UPI's plan to create MOOCs in collaboration with other HEIs in Indonesia, supported by the Indonesian Cyber University Institute, to enable students from different universities to take online courses and to gain and transfer credits. UPI is also in the process of adapting its processes to enable hybrid and blended forms of learning by combining face-to-face with online teaching/learning scenarios. The peers acknowledge that during the pandemic UPI has already applied online courses comprising synchronous and asynchronous elements of the teaching and learning process and has enabled all students to actively participate in its courses, irrespective if remotely from home or at UPI (the latter offering a fall-back option for those few students who could not access the courses from home, e.g. due to technical or internet connectivity problems).

In summary, a variety of appropriate teaching methods and instruments are used to support students in achieving the intended learning outcomes.

Criterion 2.4 Support and assistance

Evidence:

- Self-Assessment Report
- Academic Guidelines
- Discussions during the audit

Preliminary assessment and analysis of the peers:

The peers observe that there are a variety of sophisticated and well-organised support mechanisms in place at UPI, to help students to successfully organise, implement and finalise their studies without a delay. Students are informed about the student consultation structures provided by their lecturers and academic supervisors and how they can access

them. They also find information on the website, and there is a dedicated web portal to enhance the interaction between students and their academic advisors.

In fact, at the start of the first semester, an academic advisor is assigned to every student. This member of the academic staff is the student's first port of call for advice and support on study-related and personal matters. The academic advisor periodically provides advisory sessions, supports students in selecting and scheduling courses, gives online approval to the students' study plan every semester, regularly performs and discusses with the student monitoring and evaluation activities on the student's course progress and achievements. Moreover, she or he refers students who have problems for further guidance, counselling or career development services at UPI.

At the beginning of each semester, there is an academic advisory session for students, informing them about all relevant course-specific information and resources. All students at UPI have access to the digital academic portal which is integrated into the University Information System. The students' profiles (student history, study plan, academic transcript and grade point average/GPA, lecturer evaluation, course list) are available via the system and accessible both for the students and their respective academic advisor.

Furthermore, following their specific career development interests, students have the chance to participate in targeted trainings, e.g. to improve their English skills, abilities in data analysis, academic writing, ITC skills, and are encouraged to participate in subject-specific academic Olympiads and competitions (Mathematics Olympiad, Computer Olympiad, national mathematics and science competitions etc.). Support structures furthermore entail the opportunity to attend expert-led seminars e.g. on writing and publishing papers and assistance in attending international seminars held by the study programme, faculty or university. The Career Development Centre of UPI organises job career events every semester by inviting stakeholders from industry and business to host the event, creating valuable links to the labour market and potentially generating job opportunities for students who are about to graduate. UPI collaborates with a number of universities and institutions in Indonesia and abroad (see criterion 4.3 on Resources) and encourages students to benefit from exchange opportunities e.g. by applying for an exchange programme.

Moreover, there are several student organizations at UPI; they include student's activity clubs, which are divided into arts, sports, religious and other non-curricular activities.

Students stress that teachers at UPI are open-minded, communicate well with them and take their opinions and suggestions into account when implementing changes.

The peers positively remark that students are informed about study related and course-specific matters by their academic advisors and by Faculty members at the beginning of

each semester. Lecturers explain well the course mechanisms and adequately provide course related details during the first course session.

To conclude, there are good and trustful rapports between UPI's staff members and the students and sound support mechanisms in place, both specifically and generally, to adequately assist the students in achieving their learning outcomes and in completing their courses within the scheduled time.

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

The peers stress UPI's efforts to foster internationalisation and further encourage and incentivise international student mobility. They appreciate UPI's plan to carefully and regularly monitor the student workload, and to take corrective actions where needed, in order to ensure that it remains manageable.

The auditors regard criterion 2 to be fulfilled.

3. Exams: System, concept and organisation

Criterion 3 Exams: System, concept and organisation

Evidence:

- Self-Assessment Reports
- Module descriptions
- Academic Handbooks

Preliminary assessment and analysis of the peers:
According to the SAR, the students' academic performance is evaluated based on their attendance and participation in class, assignments, homework, presentations, mid-term exam, and the final exam at the end of each semester.

The most common type of evaluation used are written examinations. Quizzes, assignments (small projects, reports, etc.), laboratory reports, presentations, seminars, and discussions may, however, contribute to the final grade as well. In general, the Mid-Semester Examination is administered on the eighth session and the Final-Semester Examination on the 16th meeting. Students can take the Final-Semester Examination if they have attended at least 80% of the sessions in a particular course. The administration of the Mid-Semester Examination is left to the lecturer of the course. The administration of the Final-Semester Examination, remedial teaching, and entry of grades is regulated by the Rector through the

Vice Rector for Education and Student Affairs. Examination schedules of the Core Competency Courses are prepared by the study programme and published offline or online on UPI Academics. The examination schedules are prepared by considering the time and student's load. Only a maximum of two examinations are scheduled per day.

The peers identify that UPI's website publishes module handbooks for each of the four study programmes which inform students about the share of the mid-semester examination grade, the final semester examination grade as well as additional examination forms such as quizzes and exercises counting towards the overall grade of the module. The form of the exam is not specified in the module descriptions, which, however, is a requirement for the module descriptions. According to the peers students would benefit from further detailed information about possible examination forms for each module. Therefore UPI must update the Module Handbooks accordingly and provide information about the assessment form (see previous criterion and criterion 5).

Students who achieved a minimum of 105 SKS with a GPA of at least 2.50 and have a recommendation from an academic supervisor, are eligible for the thesis track of UPI, enabling them to write a thesis – under the guidance of two thesis supervisors. The thesis usually consists of literature study, practical research, and data analysis. Students of the thesis-track, which so far have in fact been all students graduating in the four degree programmes, have to defend their thesis in front of the thesis supervisors. The peers positively state that it is also possible to write the final thesis during the internship undertaken outside UPI. In this case, one co-supervisor comes from the respective company/institution.

Students who have achieved at least 105 SKS but have a GPA of around 2.00 – 2.49 must take the non-thesis track in which case they take thesis substitute courses provided by the department or study programme, and conduct an essay or final assignment.

The peers inform UPI that it must be regulated for all students graduating from one of the degree programmes that upon graduation, by means of an undergraduate thesis or project, they have to demonstrate that they worked independently on a topic, on the level aimed for (also refer to criterion 1.3). The peers conclude that UPI is requested to change its regulations accordingly in order to meet these international standards.

Making-up for failed or missed examination is clearly regulated. Students are entitled to repeat an exam if their absence is caused by an illness (proven by a doctor's certificate), a task of representing the university in intra-curricular or extra-curricular activities outside campus or other permissible reasons clearly justified. Make-up examinations are administered and scheduled by the lecturer in agreement with the students. Students who failed a course, can sign up for the course again in the following semester. Students who failed a

mid-term exam can re-take the mid-term-exam in the same semester, shortly after the initial mid-term. Some courses allow students, whose grades are still below the passing level, to improve their grades through repeating an exam. Students can repeat an exam for an unlimited amount of times. As the drop-out rate is low and students in general do not tend to drastically exceed the regular study duration in the four programmes, the peers deem this unproblematic. Furthermore, there is a natural limit to the number of possible repetitions of exam/modules due to the maximum study duration of 14 semesters.

Overall, the peers are mostly satisfied with the exam regulations in the degree programmes. They recommend to indicate optional forms of assessments in the module handbooks and demand that UPI makes a thesis or final project mandatory for all students finalising the degree programme. They inspect samples of examination papers and Bachelor's theses for each study programme and are satisfied with the quality for the level aimed at.

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

The reviewers welcome the departments' plan to discuss amending the study regulations with UPI's leadership in order to make a final thesis or project work mandatory for all students graduating. They stress that a final thesis/project demonstrating students' independent work is a requirement for Bachelor's programmes according to international standards.

The peers continuously regard criterion 3 as mostly fulfilled.

4. Resources

Criterion 4.1 Staff

Evidence:

- Self-Assessment Reports
- Staff Handbooks
- Study plans
- Module descriptions
- Discussions during the audit

Preliminary assessment and analysis of the peers:
The peers acknowledge that the workload and performance of lecturers is monitored each semester and year and appropriately and regularly examined if the number of lecturers in the study programme under consideration is sufficient, excessive, or insufficient.

The SAR explains that lecturer recruitment in the Department of Mathematics Education and the Department of Computer Science Education is carried out through two selection tracks, namely the selection of Civil Servant Candidates (CPNS) by the Government; and the independent selection of permanent employees (non-civil servant) by UPI. The minimum academic qualification for a lecturer is a master's degree (S2). The Teaching Staff at the Department of Mathematics Education consists of 46 persons, 29 (63%) have a PhD, 17 a Master's degree. Out of the 28 teaching staff members of the Department of Computer Science, 8 (28%) have a PhD while the majority, 20 staff members, have a Master's degree. According to UPI, the number of staff hired at both departments has been sufficient. The current teacher-to-student ratio at the Department of Mathematics Education has been 1:12 to 1:13 and between 1:22 and 1:25 in the Department of Computer Science Education in the last three years (2017-2018, 2018-2019, 2019-2020), which are good ratios by national as well as international standards. The Department of Computer Science Education aims to meet the training needs also by coaching students with outstanding skills as peer tutor and alumni involvement as guest lecturers. Student and teachers confirm that there is sufficient staff involved in all areas of the curriculum.

UPI conducts studies concerning the professional competencies of lecturers and the degree to which they correspond to the graduate profiles and expected learning outcomes.

All members of the teaching staff are obliged to be involved in (1) teaching/advising, (2) research, and (3) community service; the workload can be distributed differently between the three areas from teacher to teacher. The teachers confirm that the workload in order to carry out their activities is feasible.

In summary, the peers confirm that the number of the teaching staff and their scientific orientation as well as the distribution of work in teaching/advising, research and community service activities are suitable for successfully implementing and sustaining the degree programmes. However, they encourage UPI to increase the share of staff members with a PhD as well as professors among the staff members, particularly for the Computer Science and Computer Science Education programmes. They acknowledge that UPI already takes corresponding actions in order to do so (see also criterion 4.2).

Criterion 4.2 Staff development

Evidence:

- Self-Assessment Report
- Staff handbooks
- Discussions during the audit

Preliminary assessment and analysis of the peers:
UPI encourages the training of its academic and technical staff with a focus on improving teaching abilities and supporting publications. This is done by providing training in teaching methodologies and publication writing. Young staff members with a Master's degree are encouraged to pursue doctoral studies in Indonesia or abroad.

The two departments and the formal science cluster have allocated funds and organised several activities related to the professional and knowledge development of the lecturers to strengthen their capacities.

Lecturers with a Master's degree are incentivised to pursue doctoral studies based on their research interests, expertise and study programme's needs in Indonesia or overseas. The total number of staff with a PhD has gradually increased over the last ten years, and UPI intends to reach 85% of lecturers with a doctoral degree or involved in a doctoral study programme by 2026. The peers recommend that the share of staff members with a PhD as well as the share of professors among the staff should be further increased and acknowledge UPI's strategy to increase the number of PhD candidates as a step in this direction.

Further measures include inviting guest speakers from Indonesia and abroad, forming groups of expertise comprising lecturers, research partners, students, associations and industry, peer monitoring and training (for junior lecturers by senior lecturers) as well as the option for lecturers to join professional organisations at both national and international level. Academic supervisors take part in student-administration software development trainings, lecturers in addition in workshops for Standard Operating Procedures for academic activities and in data input trainings for accreditation standards.

The peers discuss with the members of the teaching staff the opportunities to develop their personal skills and learn that the teachers are satisfied with the internal further training programme at UPI, their opportunities to improving their didactic abilities and to spend some time abroad for research activities or to attend conferences and workshops. At national level they can attend a writing, multimedia or ICT-based software development training or acquire teaching methods, including online. Lecturers are encouraged and supported to spend time abroad (for a training, workshop, seminar or scientific publication) or conduct collaborative research with an overseas university or institution, mainly in Asia,

through research or lecturer development grants, visiting professorships. Furthermore, national and international speakers and experts are invited. Twice a year each department holds Community Service Activities. Local teachers receive coaching by the community and the involvement of students.

In summary, the auditors confirm that UPI offers sufficient support mechanisms and opportunities for members of the teaching staff who wish to enhance their professional and teaching skills, but agree that the staff should be more encouraged to publish in internationally acknowledged journals.

To keep track with emerging research trends and scientific progress, it is important to constantly develop the proficiency level and research output of the teaching staff (e.g. by increasing the number of PhD and professors among the staff members). Moreover, being gradually on its way to a research-oriented department by considering to implement Master's degree programmes in Mathematics and Computer Science sometime in the future, it would become more important to hire staff members with a diverse educational background, experiences, and degrees earned from different institutions to ensure a broad perspective.

Criterion 4.3 Funds and equipment

Evidence:

- Self-Assessment Reports
- Video of the facilities
- Discussions during the audit

Preliminary assessment and analysis of the peers:
Basic funding of the degree programmes and the facilities is provided by UPI and the Faculty of Mathematics and Science Education. The financial sources are government funding, tuition fees from students, community and industry funding. Additional funds for research activities can be provided by UPI or the Indonesian government, but the teachers have to apply for them.

The provided budget allows the departments to conduct the study programmes as well as some specific activities, including – to a certain degree – student exchange programmes, student financial assistance for research, and participation in international conferences. According to the peers, international collaboration opportunities should be intensified, particularly through cooperation agreements with institutions outside Asia.

The academic staff members emphasise that from their point of view, all programmes under review receive sufficient funding for teaching and learning activities. The students confirm this positive impression and state their satisfaction with the available resources, which should be enhanced to foster international collaborations.

From the provided documents and videos of the classrooms and computer laboratories, the peers deduct that there seem to be no bottlenecks due to missing equipment or a lacking infrastructure. The students confirm during the discussion with the peers that they are satisfied with the available equipment. From the students' point of view, access is provided to current international literature and databases, a remote access is also possible. The peers learn that during the pandemic students did not face problems when accessing courses and the intended learning platforms and material. Throughout the pandemic, students were able to enter UPI's classrooms and facilities in case their Internet connection was bad or if they faced technical difficulties. The lecturers would appreciate if UPI would provide additional equipment in the context of hybrid learning which becomes more and more important during and after the pandemic. The peers support UPI's policy that each faculty should allocate financial resources to enable blended and hybrid learning in order to meet the (post-)pandemic challenges and for teachers to be able to develop synchronous and asynchronous learning units.

The reviewers judge that there is sufficient funding for the entire accreditation period, and that the technical equipment and infrastructure (classrooms, library, seminar rooms etc.) are adequate for appropriately implementing the degree programmes under review.

The reviewers are informed about the reasons for the gap between the funding per student in the Department of Computer Science Education and the Department of Mathematics Education, the latter receiving more funding (1359 Euro compared to 980 Euro). Funding is based on the number as well as the economic situation per students. Thus, the more students and the economically better off the students are, the more funding a department gets. Computer Science and Computer Science Education are newer study programmes with fewer students and a smaller teaching staff group, which is the reason that funding is more limited compared to the Department of Mathematics Education. However, UPI can allocate affirmative action funding in case a degree programme requires a teaching laboratory or alike. The situation is expected to change with UPI's priority area in the field of digitalisation, as new buildings are currently built and the Department of Computer Science will benefit from additional funding in the next three years.

In summary, the peer group judges the available funds, the technical equipment, and the infrastructure (laboratories, library, seminar rooms etc.) to comply with the requirements for adequately sustaining the degree programmes.

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

The auditors observe that – in line with their recommendation for the degree programmes in Computer Science Education and Computer Science – UPI intends to increase the share of lecturers with a PhD as well as professors among its staff members. They appreciate that UPI aims to develop the proficiency level and research output of its teaching staff in order to be able to keep track with emerging research trends and scientific progress and to continuously adapt the degree programmes in line with these developments.

As the peer assessment on criterion 4 was otherwise approved or not commented on by UPI respectively, the peers confirm their original assessment and regard criterion 4 to be fulfilled.

5. Transparency and documentation

Criterion 5.1 Module descriptions

Evidence:

- Self-Assessment Report
- Module descriptions
- Website Ba Mathematics Education: https://home.matematika.upi.edu/
- Website Ba Mathematics: https://home.matematika.upi.edu/
- Website Ba Computer Science Education: https://cs.upi.edu/v2/home
- Website Ba Computer Science: https://cs.upi.edu/

Preliminary assessment and analysis of the peers:

The module handbooks are published on UPI's homepage on the website of the two departments, they are thus accessible to students and all stakeholders. The peers observe that the module handbooks contain information on most required aspects, that is the responsible person, the intended learning outcomes, the credit points awarded for the module, the workload, the main contents, prerequisites and recommended literature. The module descriptions do not always make the (exemplary) examination and teaching methods applied during the module transparent nor do they always entail explicit information if a course is compulsory or elective. UPI must revise its module descriptions so that they indicate for each module/course whether it is compulsory or elective and that they contain information on the forms of assessment and teaching methods for each individual module/course.

Criterion 5.2 Diploma and Diploma Supplement

Evidence:

- Self-Assessment Report
- Sample Diploma for each degree programme
- Sample Diploma Supplement for each degree programme

Preliminary assessment and analysis of the peers:
According to UPI, all students of the four degree programmes under review are automatically awarded a Diploma and a Diploma Supplement (DP) after graduation. The Diploma consists of a Diploma Certificate and a Transcript of Records. The DP contains all necessary information about the degree programme including information relevant for professional and personal development (e.g. acquired subject-specific and soft skills, obtained awards and certificates in the context of courses, competitions, academic and volunteering work). The peers appreciate that the DP are among the documents automatically issued to students upon graduation and asks UPI to include this information also in its Standard Operational Procedures. The Transcript of Records lists all the courses that the graduate has completed, the achieved credits, grades, and cumulative GPA, and mentions the seminar and thesis titles.

Criterion 5.3 Relevant rules

Evidence:

- Self-Assessment Report
- Website of degree programmes
- Standard Operational Procedures

Preliminary assessment and analysis of the peers:
The auditors confirm that the rights and duties of both UPI and the students are clearly defined and binding. All rules and regulations are published on UPI's website and hence available to all stakeholders. In addition, the students receive all relevant course material in the language of the degree programme at the beginning of each semester.

The peers notice that both the Indonesian and the English websites of the programmes are sufficiently informative. For each of the four programmes the objectives, the profile, the curriculum structure and mapping, the module handbooks as well as the standard operating procedures (e.g. related to academic registration, study schedule development, facility utilisation and maintenance, examination, final defense, drop-out, evaluation and monitoring), can be easily found, are available in both languages, and freely accessible for all stakeholders.

The peers observe that there is an official regulation on the recognition of credits acquired abroad in the context of the newly established “Freedom of learning” Programme (see criterion 2.1).

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

The reviewers acknowledge UPI’s plan to update the module descriptions and indicate for each module/course whether it is compulsory or elective, and to specify the forms of assessment and the teaching methods for each individual module/course.

The auditors consider criterion 5 to be mostly fulfilled.

6. Quality management: quality assessment and development

Criterion 6 Quality management: quality assessment and development

Evidence:

- Self-Assessment Report
- Academic Guidelines
- Discussions during the audit

Preliminary assessment and analysis of the peers:
The peers discuss the quality management system at UPI with the programme coordinators and the students. They learn that there is a continuous process in order to improve the quality of the degree programmes and it is carried out through internal and external quality assurance (QA) and that the quality management system is based on clearly elaborated structures and mechanisms involving all stakeholders.

The Rector oversees quality assurance which is carried out by the Quality Assurance Unit (SPM) and the Faculty Leaders of UPI. At faculty level, the SPM coordinates the implementation of QA with the heads of the study programmes.

At the department or study programme level QA is carried out by the Quality Control Group (GKM). SPM carries out annual internal quality audits (AMI) based on UPI AMI guidelines and annual study programme performance reports (self-evaluation reports) prepared by the respective head of the study programme together with the GPM. The reports address measurement data, identified problems and their causes, preventive and corrective actions planned related to educational standards, research, community service and student affairs.

Two internal auditors assigned by SPM visit each study programme to ensure conformity between the report and the implementation of activities. The results are discussed in a management review meeting to plan follow-up actions, which are re-evaluated during the next internal audit. Related to the educational standards, each study programme reports its achievements twice a year (mid-year, year-end report), coordinated by the faculty to be reported to the Directorate of Planning and Development at university level. Faculty and university leaders use the evaluation results to improve the performance of the study programmes. Related to the research and community service, the Institute for Research and Community Service periodically carries out quality assurance by asking researchers to report on their research or community service activities and through reporting mechanisms (annual progress and final reports).

At individual (lecturer) basis, lecturers update their curriculum vitae every year and make a workload report every semester reported to UPI and submitted to the Directorate General of Higher Education after being validated by two assessors. All lecturers make a plan for employee performance targets, which becomes part of the SKP assessment, together with an assessment of employee work behaviour (criteria are service orientation, integrity, commitment, discipline, cooperation, leadership).

Apart from internal quality assurance, the programmes regularly undergo external quality assurance measures such as the obligatory accreditation by the National Accreditation Board for Higher Education (BAN PT) carried out every five years. In the context of the latest accreditations all four programmes obtained the grade A “excellent”. The Faculty FPMIPA UPI also underwent an ISO 9001: 2015 certification process carried out by the independent certification body TNV System Certification P Ltd., certified by International Accreditation Services taken at all relevant levels (general UPI, Department) and by involving all relevant stakeholders and target groups concerned (programme coordinators, lecturers, students, internal and external supervisors, alumni and external stakeholders/partners).

Course and lecturer performance evaluation is carried out each semester, based on clearly defined criteria. It is clearly stated what happens in case of identified deficiencies in terms of the lecturers’ pedagogical competencies. In this case the teaching staff attends pedagogical training, acquires new teaching approaches and methods, innovation media and learning tools, or learns about how to create a positive learning climate for students. Recently, online learning is included.

Based on the assessment of the SAR and the discussion with UPI’s representatives, the peers recommend UPI to regularly monitor the students‘ workload e.g. by including a ques-

tion about the feasibility of and satisfaction with the workload in the Questionnaire of Student Feedback on Teaching & Learning as well as in UPI's Plan, Do, Check, Action (PDCA) cycle mechanism.

To conclude, the peers confirm that the quality management system at UPI is, besides the mentioned deficit, appropriately designed to regularly identify weaknesses and to take corrective actions in order to continuously improve the degree programmes.

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

As UPI appreciates the peers' review, the final assessment of the peers for criterion 6 remains unchanged.

The auditors consider criterion 6 to be fulfilled.

D Additional Documents

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

No additional documents needed.

E Comment of the Higher Education Institution (16.02.2022)

The institution provided a detailed statement.

F Summary: Peer recommendations (17.08.2021)

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

Degree Programme	ASIIN Seal	Subject-specific label	Maximum duration of accreditation
Ba Mathematics Education	With requirements for one year	–	30.09.2027
Ba Mathematics	With requirements for one year	–	30.09.2027
Ba Computer Science Education	With requirements for one year	–	30.09.2027
Ba Computer Science	With requirements for one year	–	30.09.2027

Requirements

For all degree programmes

A 1 (ASIIN 1.3, ASIIN 3) An undergraduate thesis or final project must become a compulsory part of the curriculum for all students aiming to graduate, ensuring that they worked independently on a given task and at the level aimed for before they graduate.

A2 (ASIIN 3, ASIIN 5.1) The Module Handbook must be completed and provide information about the teaching methods, forms of assessment/examination and an indication if the module/course is compulsory or elective for all modules/courses.

Recommendations

For Mathematics Education and Computer Science Education

E 1. (E, ASIIN 1.3) It is recommended to increase the number of electives to ensure that students can specialise on and will receive targeted education and training for the school level aimed at (lower secondary schools, upper secondary schools, vocational schools).

For Computer Science Education and Computer Science

E 2. (ASIIN 4.1) It is recommended to increase the number of staff with a PhD and of professors among the staff members.

For all degree programmes

E 3. (ASIIN 4.3) It is recommended to enhance funding to foster international mobility (e.g. for students more full scholarships, for lectures more stipends).

E 4. (ASIIN 2.1, 4.2, 4.3) It is recommended to increase the research output and number of international collaborations (publications in internationally acknowledged journals, international exchange collaborations outside Asia).

E 5. (ASIIN 6) It is recommended to systematically close the course evaluation loop by ensuring that all students are informed about the evaluation results and improvements made.

E 6. (ASIIN 6) It is recommended to regularly monitor the students‘ work load and take corrective actions where needed.

G Comment of the Technical Committees 04 and 12 (08.03.2022)

Technical Committee 04 – Informatics/Computer Science (08.03.2022)

Assessment and analysis for the award of the ASIIN seal:

The Technical Committee discusses the procedure. It changes the wording of the first requirement, as the second part of the sentence is redundant. It also adapts the wording of the recommendation E2.

The Technical Committee 04 – Informatics/Computer Science recommends the award of the seals as follows:

Degree Programme	ASIIN Seal	Subject-specific label	Maximum duration of accreditation
Ba Computer Science Education	With requirements for one year	–	30.09.2027
Ba Computer Science	With requirements for one year	–	30.09.2027

Requirements

For all degree programmes

A 1. (ASIIN 3) An undergraduate thesis or final project must become a compulsory part of the curriculum.

A 2. (ASIIN 3, ASIIN 5.1) The Module Handbook must provide information about the teaching methods, forms of assessment/examination and an indication if the module/course is compulsory or elective for all modules/courses.

Recommendations

For Mathematics Education and Computer Science Education

E 1. (ASIIN 1.3) It is recommended to increase the number of electives to ensure that students can specialise on and will receive targeted education and training for the school

level aimed at (lower secondary schools, upper secondary schools, vocational schools).

For Computer Science Education and Computer Science

E 2. (ASIIN 4.1) It is recommended to increase the number of professors and staff members with a PhD.

For all degree programmes

E 3. (ASIIN 4.3) It is recommended to enhance funding to foster international mobility (e.g. for students more full scholarships, for lectures more stipends).

E 4. (ASIIN 4.2, 4.3) It is recommended to increase the research output and number of international collaborations (publications in internationally acknowledged journals, international exchange collaborations outside Asia).

E 5. (ASIIN 6) It is recommended to systematically close the course evaluation loop by ensuring that all students are informed about the evaluation results and improvements made.

E 6. (ASIIN 6) It is recommended to regularly monitor the students‘ work load and take corrective actions where needed.

Technical Committee 12 – Mathematics (04.03.2022)

Assessment and analysis for the award of the ASIIN seal:

The Technical Committee discussed the procedure and agrees with the assessment of the expert group without any changes.

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

Degree Programme	ASIIN Seal	Subject-specific label	Maximum duration of accreditation
Ba Mathematics Education	With requirements for one year	–	30.09.2027
Ba Mathematics	With requirements for one year	–	30.09.2027

H Decision of the Accreditation Commission (18.03.2022)

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

The Accreditation Commission discusses the procedure. They agree with the assessment of the auditors and the technical committees. However, they decide to reformulate the recommendation E 2 in order to be more precise.

The Accreditation Commission decides to award the following seals:

Degree Programme	ASIIN Seal	Subject-specific label	Maximum duration of accreditation
Ba Computer Science Education	With requirements for one year	–	30.09.2027
Ba Computer Science	With requirements for one year	–	30.09.2027
Ba Mathematics Education	With requirements for one year	–	30.09.2027
Ba Mathematics	With requirements for one year	–	30.09.2027

Requirements

For all degree programmes

A 1. A 1. (ASIIN 3) An undergraduate thesis or final project must become a compulsory part of the curriculum.

A 2. (ASIIN 3, ASIIN 5.1) The Module Handbook must provide information about the teaching methods, forms of assessment/examination and an indication if the module/course is compulsory or elective for all modules/courses.

Recommendations

For Mathematics Education and Computer Science Education

E 1. (ASIIN 1.3) It is recommended to increase the number of electives to ensure that students can specialise on and will receive targeted education and training for the school

level aimed at (lower secondary schools, upper secondary schools, vocational schools).

For Computer Science Education and Computer Science

E 2. (ASIIN 4.1) It is recommended to increase the number of staff members with a PhD and the number of professors.

For all degree programmes

E 3. (ASIIN 4.3) It is recommended to enhance funding to foster international mobility (e.g. for students more full scholarships, for lectures more stipends).

E 4. (ASIIN 4.2, 4.3) It is recommended to increase the research output and number of international collaborations (publications in internationally acknowledged journals, international exchange collaborations outside Asia).

E 5. (ASIIN 6) It is recommended to systematically close the course evaluation loop by ensuring that all students are informed about the evaluation results and improvements made.

E 6. (ASIIN 6) It is recommended to regularly monitor the students‘ work load and take corrective actions where needed.

I Fulfilment of Requirements (24.03.2023)

Analysis of the peers and the Technical Committees (08.03.2023)

Requirements

For all degree programmes

A 1. (ASIIN 3) An undergraduate thesis or final project must become a compulsory part of the curriculum.

Initial Treatment	
Peers	fulfilled Justification: The university has introduced a compulsory Thesis.
TC 04	fulfilled Vote: unanimous Justification: The Technical Committee discusses the procedure and follows the assessment of the peers without any changes.
TC 12	fulfilled Vote: unanimous Justification: The Technical Committee discusses the procedure and follows the assessment of the peers without any changes.

A 2. (ASIIN 3, ASIIN 5.1) The Module Handbook must provide information about the teaching methods, forms of assessment/examination and an indication if the module/course is compulsory or elective for all modules/courses.

Initial Treatment	
Peers	fulfilled Justification: The Module Handbook now contains the required information.
TC 04	fulfilled Vote: unanimous Justification: The Technical Committee discusses the procedure and follows the assessment of the peers without any changes.
TC 12	fulfilled Vote: unanimous Justification: The Technical Committee discusses the procedure and follows the assessment of the peers without any changes.

Decision of the Accreditation Commission (24.03.2023)

The accreditation commission discusses the procedure and follows the assessment of the peers and the technical committees 04 and 12.

Degree programme	ASIIN-label	Subject-specific label	Accreditation until max.
Ba Mathematics Education	All requirements fulfilled	-/-	30.09.2027
Ba Mathematics	All requirements fulfilled	-/-	30.09.2027
Ba Computer Science Education	All requirements fulfilled	-/-	30.09.2027
Ba Computer Science	All requirements fulfilled	-/-	30.09.2027

Appendix: Programme Learning Outcomes and Curricula

According to the Appendices provided with the SAR the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the Bachelor degree programme Mathematics Education:

Objectives and learning outcomes:

PLO-1	Being a good citizen, having faith and devotion to God Almighty, proud and loving the homeland and having good morals, ethics and personality.
PLO-2	Mastering literacy, critical and creative thinking competencies as well as communication and collaboration skills in the fields of mathematics, science, technology and engineering to solve various problems in an integrated and/or multidisciplinary manner
PLO-3	Mastering mathematical knowledge to support professional tasks as a mathematics teacher and self-development in a sustainable manner.
PLO-4	Mastering didactic and pedagogic concepts and principles of mathematics education.
PLO-5	Mastering the principles and techniques of planning, implementing and evaluating mathematics teaching and learning.
PLO-6	Being able to plan, implement and evaluate mathematics teaching and learning effectively.
PLO-7	Being able to take advantage of various mathematics learning resources related to science, technology and arts which are oriented towards the challenges of the future.
PLO-8	Being able to conduct research in mathematics education and determine alternative solutions based on experience or relevant research results.
PLO-9	Mastering planning and organizing various resources to support the implementation of various activities related to personal development as mathematics educators, for further study or as lifelong learners.
PLO-10	Developing the use of relevant information and communication technology to improve the quality of mathematics teaching and learning.

PLO-11 Providing guidance and counselling services to solve student learning problems so as to improve the quality of learning process and student learning outcomes

PLO-12 Being able to communicate ideas related to mathematics education based on relevant research results, both orally and in writing.

The following **curriculum** is presented:

1. **GENERAL COURSE (MKU)**

NO.	CODE	NAME OF COURSES	CREDIT	SEMESTER							
				1	2	3	4	5	6	7	8
1	KU100	Islamic Education	2	√							
2	KU101	Christian Protestant Education	2	√							
3	KU102	Catholic Christian Education	2	√							
4	KU103	Hindu Education	2	√							
5	KU104	Budhist Education	2	√							
6	KU105	Civics Education	2	√							
7	KU106	Indonesian Language Education	2	√							
8	KU108	Sports and Physical Education	2		√						
9	KU109	Konghucu Education	2	√							
10	KU110	Pancasila Education	2		√						
11	KU119	Art Education	2		√						
12	KU300	Islamic Education Seminar	2					√			
13	KU301	Seminar on Christian Protestant Education	2					√			
14	KU302	Seminar on Catholic Christian Education	2					√			
15	KU303	Seminar on Hindu Education	2					√			
16	KU304	Seminar on Budhist Education Seminar	2					√			
17	KU309	Seminar on Konghucu Education	2					√			
18	KU400	Student Community Service	2						√		
NUMBER OF CREDITS			**14**	**6**	**6***	**0**	**0**	**2**	**2**	**0**	**0**

2. BASIC EDUCATION COURSES (MKDK)											
NO.	CODE	NAME OF COURSES	CREDIT	SEMESTER							
				1	2	3	4	5	6	7	8
1	DK300	Foundations of Education	2		√						
2	DK301	Educational Psychology and Counseling	2	√							
3	DK303	Curriculum and Instruction	2				√				
4	DK304	Management of Education	2			√					
NUMBER OF CREDIT			8	2	2	2	2	0	0	0	0

3. FACULTY EXPERTISE COURSES (MKKF)											
NO.	CODE	NAME OF COURSES	CREDIT	SEMESTER							
				1	2	3	4	5	6	7	8
1	MA100	Mathematics, Science, Technology and Engineering	3	√							
2	MA200	Applied Mathematics, Science, Technology and Engineering	3		√						
NUMBER OF CREDIT			6	3	3	0	0	0	0	0	0

4. FIELD OF STUDY LEARNING EXPERTISE COURSES (MKKPBS)											
NO.	CODE	NAME OF COURSES	CREDIT	SEMESTER							
				1	2	3	4	5	6	7	8
1	MT500	Mathematics Learning Strategies	3				√				
2	MT501	Mathematics Learning Evaluation	3					√			
3	MT539	Mathematics Lesson Plan	3						√		
4	MT540	ICT Literacy and Mathematics Learning Media	3			√					
NUMBER OF CREDIT			12	0	0	3	3	3	3	0	0

5. THE CORE OF STUDY PROGRAM COURSES (MKIPS)											
NO.	CODE	NAME OF COURSES	CREDIT	SEMESTER							
				1	2	3	4	5	6	7	8
1	MT300	Basic Mathematics	3	√							
2	MT301	Differential Calculus	3		√						
3	MT302	Analytical Geometry	3		√						
4	MT303	English for Mathematics	2	√							
5	MT305	Number Theory	2	√							
6	MT306	Capita Selecta of Primary Education Mathematics	4				√				
7	MT307	Integral Calculus	3			√					
8	MT308	Basic Statistics	3		√						
9	MT309	Discrete Mathematics	3			√					
10	MT310	Capita Selecta of Secondary Education Mathematics	4					√			
11	MT311	Linear Algebra	4			√					
12	MT312	Computer Programming	3				√				
13	MT314	Data Processing	3							√	
14	MT315	Multi-variables Calculus	3				√				
15	MT316	Geometry	3			√					
16	MT317	Linear Programming	2			√					
17	MT318	Numerical Methods	3							√	
18	MT319	Entrepreneurship	2		√						
19	MT400	Group Theory	3				√				
20	MT401	Mathematics Education Seminar	2							√	
21	MT402	Ordinary Differential Equation	3					√			

22	MT403	Real Analysis	3					√			
23	MT404	Theoretical Descriptive Statistics	3					√			
24	MT413	History of Mathematics	2	√							
25	MT415	Mathematics Education Multimedia	3					√			
26	MT418	Complex variable functions	3						√		
27	MT422	Study of Mathematics Education Problems	2				√				
28	MT425	Methodology of Mathematics Education Research	3						√		
29	MT598	Undergraduate Thesis	6								√
30	MT599	Final Defense	0								√
NUMBER OF CREDIT			**86**	**9**	**11**	**15**	**15**	**16**	**6**	**8**	**6**

6. PREFERENCE EXPERTISE OF STUDY PROGRAM COURSES (MKKPPS)

NO.	CODE	NAME OF COURSES	CREDIT	SEMESTER							
				1	2	3	4	5	6	7	8
1	MT406	Vector Calculus	3						√		
2	MT407	Ring Theory	3						√		
3	MT409	Theoretical Inferential Statistics	3							√	
4	MT410	Theory of Functions of Real Variables	3							√	
5	MT412	Computer Mathematics Programming with Applications	3						√		
6	MT416	Combinatorics Mathematics	3							√	
7	MT417	Transformational Geometry	3						√		
8	MT419	Introduction to Topology	3							√	
9	MT421	Initial Value and Boundary Condition	3						√		

10	MT430	Qualitative Research Methods	3						√		
11	MT507	Decisions Theory								√	
12	MT508	Multivariate Statistical Methods	3							√	
NUMBER OF CREDIT			15	0	0	0	0	0	6	9	0

7. INTRODUCTION TO THE UNIT OF EDUCATION COURSES (MKPLSP)											
NO.	CODE	NAME OF COURSES	CREDIT	SEMESTER							
				1	2	3	4	5	6	7	8
1	MT590	Introduction to the Unit of Education (An Internship)	4								√
NUMBER OF CREDIT			4	0	0	0	0	0	0	0	4
TOTAL SKS			145	20	20	20	20	21	17	17	10

According to the Appendices provided with the SAR the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the Bachelor degree programme Mathematics:

PLO-1	Mastering both concepts and basic principles of Statistics to obtain the suitable method for theoretical analysis, modelling, and relevant simulation process.
PLO-2	Mastering both concepts and basic principles of applied mathematics to obtain for suitable method in theoretical analysis, modelling, and relevant simulation.
PLO-3	Mastering both concepts and basic principles of Algebra and implementing them to solve algebraic problems.
PLO-4	Mastering both concepts and basic principles of analysis and applying them to solve analysis problems.
PLO-5	Exploring one of the concentrations in mathematics: statistics, algebra, analysis, and applied, as a provision for further study and become a lifelong learner.
PLO-6	Being able to develop mathematical thinking, starting with procedural understanding to a broad understanding including exploration, logical reasoning, generalization, abstraction, and formal proof.
PLO-7	Being able to solve mathematical problems with or without software, and communicating the results verbally or in writing accurately and clearly.
PLO-8	Having capabilities and abilities to make proper decisions based on the results of data analysis, and can choose various alternative solutions independently and in groups to solve problems in the work environment.
PLO-9	Being able to develop networks with mentors, colleagues, peers both inside and outside the institution

PLO-10	Being able to implement technological science that pays attention to and applies humanities values according to their expertise based on scientific principles, procedures and ethics in order to produce solutions, ideas, designs, compile scientific descriptions of the results of their studies in the form of published reports.
PLO-11	Mastering at least three programming languages and five mathematical software.
PLO-12	Having literacy skills; critical and creative thinking as well as communication and collaboration skills in mathematics, science, technology, and engineering to solve various problems in an integrated and multidisciplinary manner.
PLO-13	Becoming citizens who believe and have devotion to God Almighty; proud and love the homeland; and have good morals, ethics and personality.
PLO-14	Demonstrating a responsible attitude and ability to work in their expertise independently.

The following **curriculum** is presented:

NO	CODE	NAME OF COURSES	CREDIT	SEMESTER							
				1	2	3	4	5	6	7	8
GENERAL COURSES (MKU)											
1.	KU100	Islamic Education	2	√							
2.	KU101	Protestant Education	2	√							
3.	KU102	Catholic Education	2	√							
4.	KU103	Hindu Education	2	√							
5.	KU104	Buddhist Education	2	√							
6.	KU105	Citizenship Education (PKN)	2	√							
7.	KU106	Indonesian	2	√							
8.	KU110	Pancasila	2		√						
9.	KU108	Sport Education*	2		√						
10	KU119	Art Education*	2		√						
11.	KU109	Khonghucu Education	2	√							
12.	KU300	Seminar on Islamic Education	2					√			
13.	KU301	Seminar on Protestant Education	2					√			
14.	KU302	Seminar on Catholic Education	2					√			
15.	KU303	Seminar on Hindu Education	2					√			
16.	KU304	Seminar on Buddhist Education	2					√			
17.	KU309	Seminar on Confucion Education	2					√			
18.	KU400	Community Service Program	2						√		
NUMBER OF CREDI			14	6	2/4	0	2/0	2	2	0	0

NO	CODE	NAME OF COURSES	CREDIT	SEMESTER							
				1	2	3	4	5	6	7	8
UNIVERSITY SPECIFICATION COURSES (MKKU)											
1.	HU300	Introduction to Education	2		√						
NUMBER OF CREDIT			2	0	2	0	0	0	0	0	0

NO	CODE	NAME OF COURSES	CREDIT	SEMESTER							
				1	2	3	4	5	6	7	8
3.	FACULTY EXPERTISE COURSES (MKKF)										
1.	MA100	Mathematics, Science, Technology and Engineering	3	√							
2.	MA200	Applied Mathematics, Science, Technology and Engineering	3		√						
NUMBER OF CREDIT			6	3	3	0	0	0	0	0	0

NO	CODE	NAME OF COURSES	CREDIT	SEMESTER							
				1	2	3	4	5	6	7	8
CORE EXPERTISE COMPETENCY COURSES (MKKPS)											
1.	MT 300	Basic Mathematics	3	√							
2.	MT301	Differential Calculus	3	√							
3.	MT303	English for Mathematics	2	√							
4.	MT305	Number Theory	2		√						
5.	MT307	Integral Calculus	3		√						
6.	MT308	Basic Statistics	3	√							
7.	MT309	Discrete Mathematics	3		√						
8.	MT311	Linear Algebra	4		√						
9.	MT313	Algorithm and Programming	2			√					
10.	MT314	Data Processing	2				√				
11.	MT315	Multivariable Calculus	3			√					
12.	MT316	Geometry	3			√					
13.	MT317	Linear Programming	2			√					
14.	MT400	Group Theory	3			√					
15.	MT402	Ordinary Differential Equations	3			√					
16.	MT403	Real Analysis	3				√				
17.	MT404	Theoretical Descriptive Statistics	3			√					
18.	MT405	Modular Programming	2				√				
19.	MT406	Vector Calculus	3					√			
20.	MT407	Ring Theory	3				√				
21.	MT408	Numerical Analysis	3					√			
22.	MT409	Theoretical Inferential Statistics	3				√				

23.	MT410	Differential Real Functions Theory	3					√			
24.	MT411	Operations Research	3					√			
25.	MT412	Mathematics Computer Application Program	3						√		
26.	MT416	Combinatorial Mathematics	3				√				
27.	MT417	Transformation Geometry	3					√			
28.	MT418	Functions of Complex Variables	3						√		
29.	MT419	Introduction to Topology	3					√			
30.	MT428	Mathematics Modeling	3						√		
31.	MT425	Partial Differential Equations	3				√				
32.	MT420	Methodology of Mathematics Education Research	3						√		
33.	MT427	Entrepreneurship	2						√		
34.	MT426	Selected Topics in Mathematics	3							√	
35.	MT598	Undergraduate Thesis	6								√
36.	MT599	Final Defense	0								√
NUMBER OF CREDIT			**102**	11	12	19	19	18	14	3	6

NO	CODE	NAME OF COURSES	CREDIT	SEMESTER							
				1	2	3	4	5	6	7	8
FIELD EXPERIENCE PROGRAM COURSES (MKPPL)											
1.	MT590	Internship Program (PPL)	4							√	
NUMBER OF CREDIT			**4**	0	0	0	0	0	0	4	0

NO	CODE	NAME OF COURSES	CREDIT	SEMESTER							
				1	2	3	4	5	6	7	8
a.	**ELECTIVE EXPERTISE COURSES OF STUDY PROGRAM (MKKPPS)**										
	STATISTICS EXPERTISE										
1.	MT429	Econometrics	3						√		
2.	MT505	Sampling Theory	3						√		
3.	MT506	Experimental Research Design	3							√	
4.	MT507	Decision Theory	3							√	
5.	MT508	Methods in Multivariate Statistics	3							√	

6.	MT521	Analysis of Regression and Correlation	3						√		
7.	MT524	Method of Time Series	3							√	
8.	MT530	Bayesian Theory	3								√
9.	MT532	Live Times	3							√	
10.	MT541	Non-parametric Statistics	3						√		
NUMBER OF CREDIT			**18**						12	15	3

NO	**CODE**	**NAME OF COURSES**	**CREDIT**	**SEMESTER**							
				1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
	ALGEBRA EXPERTISE										
1.	MT510	Advanced Linear Algebra	3							√	
2.	MT511	Structure of Groups and Rings	3							√	
3.	MT512	Operator Algebra	3								√
4.	MT525	Applied Algebra	3							√	
5.	MT533	Modul Theory	3							√	
6.	MT537	Matrix Algebra	3						√		
7.	MT538	Graph Algebra	3								√
NUMBER OF CREDIT			**18**						3	12	6

NO	**CODE**	**NAME OF COURSES**	**CREDIT**	**SEMESTER**							
				1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
	ANALYSIS EXPERTISE										
1.	MT514	Advanced Functions of Complex Variables	3							√	
2.	MT515	Functional Analysis	3							√	
3.	MT527	Topology	3						√		
4.	MT535	Function Series and Riemann Integral	3							√	
5.	MT536	Theory of Measure and Integral	3								√
NUMBER OF CREDIT			**18**						3	9	3

NO	**CODE**	**NAME OF COURSES**	**CREDIT**	**SEMESTER**							
				1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
	APPLIED EXPERTISE										
1.	MT542	Cryptography	3								√
2.	MT519	Optimization Method	3							√	

3.	MT520	Computational Geometry	3						√		
4.	MT424	Graph Theory	3						√		
5.	MT523	Multimedia	3							√	
6.	MT534	Dynamic System	3							√	
NUMBER OF CREDIT			**18**						3	12	3
Total			**146**	20	19	19	21	20	22	16	9

According to the Appendices provided with the SAR the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the Bachelor degree programme Computer Science Education:

PLO-1	Being a good citizen, having faith and devotion to God Almighty, proud and loving the homeland and having good morals, ethics and personality.
PLO-2	Mastering literacy, critical and creative thinking competencies as well as communication and collaboration skills in the fields of mathematics, science, technology and engineering to solve various problems in an integrated and/or multidisciplinary manner
PLO-3	Mastering theory and pedagogic knowledge related to planning, implementation and evaluation in the learning process proses
PLO-4	Able to apply logical, critical, systematic, and innovative thinking in the context of the development or implementation of science and technology that pays attention to and applies humanities values in accordance with the field of computer science education
PLO-5	Able to integrate skills (1) learning and innovation (learning and innovation skills), (2) mastery of information, media, and technology (information, media and technology skills), and (3) career development and life skills (life and career skills)
PLO-6	Have initiative and curiosity as provisions for life-long learning
PLO-7	Able to solve computer science problems using computational mathematics approaches and algorithms
PLO-8	Able to manage software development projects by collaborating interdisciplinary
PLO-9	Able to develop science and technology by paying attention to scientific approaches and scientific ethics to foster experience as a provision to work in the field.
PLO-10	Able to apply pedagogic science creatively and innovatively in accordance with the characteristics of students and the learning environment.

The following **curriculum** is presented:

	1. General Courses (MKU)									
No	Course code	Course	Credits	Semester							
				1	2	3	4	5	6	7	8
1	KU100	Islamic Education	2	√							
2	KU101	Protestant Education	2	√							
3	KU102	Catholic Education	2	√							
4	KU103	Hindu Education	2	√							
5	KU104	Buddhist Education	2	√							
6	KU109	Khonghucu Education	2	√							
7	KU110	Pancasila	2		√						
8	KU105	Civic Education	2	√							
9	KU106	Indonesia Language	2	√							
10	KU108	Physical Education*	2		√						
11	KU119	Art Education*	2		√						
12	KU300	Seminar for Islamic Education	2					√			
13	KU301	Seminar for Protestan Education	2					√			
14	KU302	Seminar for Catholic Education	2					√			
15	KU303	Seminar for Hindu Education	2					√			
16	KU304	Seminar for Budha Education	2					√			
17	KU309	Seminar for Khonghucu Education	2					√			
18	KU400	Community Service Program /Student Study Service	2						√		
NUMBER OF CREDIT			14	6	4	0	0	2	2	0	0

	2. Field Experience Program Courses (MKPPL)									
No	Course code	Course	Credits	Semester							
				1	2	3	4	5	6	7	8
1	KU100	Field Experience on Education / Internship	4								√
NUMBER OF CREDIT			4	0	0	0	0	0	0	0	4

	3. Basic Courses for Education (MKDK)									
No	Course code	Course	Credits	Semester						
				1	2	3	4	5	6	7	8
1	DK300	Foundations of Education	2		√						
2	DK301	Educational Psychology and Guidance	2	√							
3	DK303	Curriculum and Instruction	2				√				
4	DK304	Management of Education	2				√				
		NUMBER OF CREDIT	8	2	2	0	4	0	0	0	0

	4. Faculty Skill Courses (MKKF)									
No	Course code	Course	Credits	Semester						
				1	2	3	4	5	6	7	8
1	MA100	Mathematics, Science, Technology and Engineering	3	√							
2	MA101	Applied Mathematics, Science, Technology and Engineering	3		√						
		NUMBER OF CREDIT	6	3	3	0	0	0	0	0	0

	5. Computer Science Learning Skill Courses (MKKPBS)									
No	Course code	Course	Credits	Semester						
				1	2	3	4	5	6	7	8
1	IK400	Learning Strategies in Computer Science	3				√				
2	IK401	Learning Evaluation in Computer Science	3					√			
3	IK402	Learning Planning/ Study Plan in Computer Science	3							√	
4	IK403	Technology Literacy and Learning Media in Computer Science	3							√	
		NUMBER OF CREDIT	12	0	0	0	3	3	0	6	0

	1. 6. Core Expertise Courses of Study Program (MKKIPS)									
No	Code	Course	Credits	Semester						
				1	2	3	4	5	6	7	8
1	IK111	Introduction to Technology and Information	3	√							
2	IK121	Computer Architecture and Organization	3	√							
3	IK131	Algorithm and Programming	3		√						
4	IK141	Data Structure	3		√						
5	IK211	System of Basis Data	3			√					
6	IK151	English	2	√							
7	IK161	Calculus	3		√						
8	IK221	Discrete Mathematics	3			√					
9	IK311	Linear Algebra and Matrix	3						√		
10	IK171	Statistics	2		√						
11	IK231	Computational Thinking	2			√					
12	IK241	Numerical Method	3				√				
13	IK251	Capita Selecta	2				√				
14	IK321	Seminar							√		
15	IK261	Entrepreneurship	2							√	
16	IK271	Ethics in Profession	2				√				
17	IK331	Research Methodology in Computer Science	3					√			
18	IK598	Undergraduate Thesis	6								√
19	IK599	Thesis Defense	0								√
20	IK281	Operating System	3					√			
NUMBER OF CREDIT			54								
Software Engineering											

21	IK312	Software Engineering	3						√		
22	IK212	Internet Programming	3				√				
23	IK222	Object-Oriented Programming	3				√				
24	IK322	Mobile Programming	3					√			
NUMBER OF CREDIT			12								
Computer and Network Engineering											
25	IK113	Electronics Circuit	3			√					
26	IK213	Computer Network	3			√					
27	IK313	Network Infrastructure & System Administration	3					√			
NUMBER OF CREDIT			9								
Multimedia											
28	IK314	Audio and Video Processing	3					√			
29	IK324	Animation	3					√			
30	IK214	Graphic Design	3			√					
NUMBER OF CREDIT			9								
Total			84	8	11	20	13	15	9	2	6

	7. Elective Courses for Education										
No	Course code	Course	Credits	Semester							
				1	2	3	4	5	6	7	8
1	IK317	Management and Information System for Education	3							√	
2	IK327	Artificial Intelligence (AI)	3							√	
3	IK337	Computer and Society	3							√	
4	IK347	Design and Analysis of Algorithms	3						√		
5	IK357	Human and Computer Interaction	3					√			
6	IK367	Business Intelligence	3							√	
7	IK377	Information Management	3						√		

8	IK387	Internet of Things (IoT)	3							√	
9	IK397	Information System Security	3							√	
10	IK318	Internet Technology	3						√		
11	IK328	Digital Pedagogics	3						√		
12	IK338	Videography Technology	3						√		
13	IK348	Motion Graphics Design Technology	3							√	
14	IK358	Information Technology Strategic Planning	3							√	
15	IK368	Information System	3						√		
16	IK378	Mobile Learning	3							√	
17	IK388	Multimedia Security	3							√	
NUMBER OF CREDIT			51	0	0	0	0	3	18	33	0
Total			**146**	**19**	**20**	**20**	**20**	**20**	**20**	**17**	**10**

According to the Appendices provided with the SAR the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the Bachelor degree programme Computer Science:

PLO-1	Being a good citizen, having faith and devotion to God Almighty, proud and loving the homeland and having good morals, ethics and personality.
PLO-2	Mastering literacy, critical and creative thinking competencies as well as communication and collaboration skills in the fields of mathematics, science, technology and engineering to solve various problems in an integrated and/or multidisciplinary manner.
PLO-3	Mastering theoretical concepts related to computing, algorithms and programming including specialization in the fields of software engineering, artificial intelligence, multimedia, computer networks, data analysis, and information systems in accordance with the dynamics of technological development.
PLO-4	Have the ability to use computer hardware and software effectively that upholds professionalism and integrity.
PLO-5	Able to conduct research in the field of information technology by paying attention to the values of the humanities, scientific ethics, and scientific approach.
PLO-6	Able to produce original and solution information technology products/applications to solve problems effectively and efficiently in society, industry, government, and other institutions.
PLO-7	Able to disseminate innovative and creative ideas both orally and in writing through a lifelong learning process and self-development that follows the times.

The following **curriculum** is presented:

	1. General Courses (MKU)										
No	Course code	Course	Credits	Semester							
				1	2	3	4	5	6	7	8
1	KU100	Islamic Education	2	√							
2	KU101	Protestant Education	2	√							
3	KU102	Catholic Education	2	√							
4	KU103	Hindu Education	2	√							
5	KU104	Buddhist Education	2	√							
6	KU109	Khonghucu Education	2	√							
7	KU110	Pancasila	2		√						
8	KU105	Civic Education	2	√							
9	KU106	Indonesian Language	2	√							
10	KU108	Physical Education*	2		√						
11	KU119	Art Education*	2		√						
12	KU300	Seminar for Islamic Education	2					√			
13	KU301	Seminar for Protestant Education	2					√			
14	KU302	Seminar for Catholic Education	2					√			
15	KU303	Seminar for Hindu Education	2					√			
16	KU304	Seminar for Buddhist Education	2					√			
17	KU309	Seminar for Khonghucu Education	2					√			
18	KU400	Community Service Program /Student Study Service	2						√		
NUMBER OF CREDIT			**14**	**6**	**4**	**0**	**0**	**2**	**2**	**0**	**0**

	2. University Specification Courses (MKKU)										
No	Code	Course Name	Credits	Semester							
				1	2	3	4	5	6	7	8
1.	HU300	Introduction of Education	2		√						
Accumulative Credits			2	0	2	0	0	0	0	0	0

No	Course code	Course	Credits	Semester							
				1	2	3	4	5	6	7	8
		3. Faculty Skill Courses (MKKF)									
1	MA100	Mathematics, Science, Technology and Engineering	3	√							
2	MA200	Applied Mathematics, Science, Technology and Engineering	3		√						
NUMBER OF CREDIT			6	3	3	0	0	0	0	0	0

NO.	CODE	COURSE NAME	CREDITS	SEMESTER							
				1	2	3	4	5	6	7	8
		4. Core Expertise Courses of Study Program (MKKIPS)									
1	IK100	Algorithm and Programming 1	3	√							
2	IK110	Calculus	3	√							
3	IK120	Programming Paradigm	2	√							
4	IK130	Information Logics	3	√							
5	IK140	English	2		√						
6	IK150	Statistics	2		√						
7	IK160	Algorithm and Programming 2	3		√						
8	IK170	Database System	3		√						
9	IK180	Linier Algebra and Metrics	2		√						
10	IK190	Professional Ethics of Information and Communication Technology	2		√						
11	IK200	Architecture and Organization Computer	3			√					
12	IK210	Numerical Method	2			√					
13	IK220	Control System	3			√					
14	IK230	Design and Web Programming	3			√					
15	IK240	Data Structure	3			√					
16	IK250	Operating System	3			√					
17	IK260	Automata Theory and Languages	3			√					
18	IK270	Software Engineering	3				√				
19	IK280	Artificial Intelligence	3				√				
20	IK290	Design and Object-Oriented Programming	3				√				
21	IK207	Computer Network	3				√				
22	IK217	Information System	3				√				
23	IK227	Techniques of Operations Research	2				√				
24	IK237	Design and Analysis of Algorithms	3				√				
25	IK300	Visual Programming and Mobile Device	3					√			
26	IK310	Cryptography	2					√			
27	IK320	Computer Graphics and Multimedia	3					√			

28	IK330	Software Project Management	3					√			
29	IK340	Intelligent system	2					√			
30	IK350	Computer and Human Interaction	3						√		
31	IK360	Capita Selecta	2						√		
32	IK370	Simulation and Modelling Techniques	2						√		
33	IK380	Non-Relational Databases	2						√		
34	IK400	Research Methodology	3							√	
35	IK410	Computer Science Entrepreneurship	2							√	
36	IK420	Seminar	2							√	
37	IK430	E-Business	2							√	
38	IK598	Undergraduate Thesis	6								√
39	IK599	Thesis Defense	0								√
NUMBER OF CREDIT			**102**	11	14	20	20	13	9	9	6

	5. EXPERTISE ELECTIVE OF STUDY PROGRAMS COURSES (MKKPS)										
				SEMESTER							
NO.	**CODE**	**COURSE NAME**	**CREDIT**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
1	IK500	Machine Learning	3					√			
2	IK510	Parallel and Distributed Computing	3					√			
3	IK520	Project Expertise	3						√		
4	IK530	Mobile Application Development	3						√		
NUMBER OF CREDIT			**9**	0	0	0	0	6	√	0	

	5.1. Software Engineering										
				SEMESTER							
NO.	**CODE**	**COURSE NAME**	**SKS**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
1	IK501	Testing and Software Management	2						√		
2	IK511	Applied Marine Engineering	2						√		
3	IK521	Service Computing Engineering	2						√		
4	IK531	Game Application Development	2						√		
5	IK541	Interfacing Technique	3						√		
6	IK551	Software Quality Management	3							√	
7	IK561	Business Application Engineering	2							√	
8	IK571	Information Engineering	3							√	
9	IK581	Software Quality Assurance	2							√	
10	IK591	Compilation Techniques	3							√	
NUMBER OF CREDIT			**9**	0	0	0	0	0	4	5	

	5.2. Robotics Control, Artificial Intelligence, And Internet Of Thing (IoT)										
				SEMESTER							
NO.	**CODE**	**COURSE NAME**	**CREDIT**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
1	IK502	Digital Image Processing	2						√		

2	IK512	Intelligent Games	2						√		
3	IK522	Natural Language Processing	2						√		
4	IK532	Deep Learning	3						√		
5	IK542	Computer Vision	2							√	
6	IK552	Internet of Things	2							√	
7	IK562	Control and Robotics	3							√	
8	IK572	Expert System	3							√	
9	IK582	Speech Recognition and Synthesis	3							√	
NUMBER OF CREDIT			9	0	0	0	0	0	4	5	

	5.3. Multimedia and Design											
				SEMESTER								
NO.	CODE	COUSE NAME	CREDIT	1	2	3	4	5	6	7	8
1	IK503	Audio and Video Techniques	2						√		
2	IK513	Game Programming	2						√		
3	IK523	Visual Communication Design	2						√		
4	IK533	Audio and Video Manipulation	2						√		
5	IK543	Multimedia Production	3							√	
6	IK553	Social and Media Innovation	2							√	
7	IK563	Animation Techniques	3							√	
8	IK573	Open Distance Learning	3							√	
NUMBER OF CREDIT			9	0	0	0	0	0	4	5	

	5.4. Computer Engineering and Network System											
				SEMESTER								
NO.	CODE	COURSE NAME	CREDIT	1	2	3	4	5	6	7	8
1	IK504	Mobile Networking	2						√		
2	IK514	Cloud Technology	2						√		
3	IK524	Network Administration	2						√		
4	IK534	Wireless Technology	3						√		
5	IK544	Computer Forensics	2							√	
6	IK554	Telecommunications Network Design	2							√	
7	IK564	Information System Security	3							√	
8	IK574	Advanced Computer Network	3							√	
NUMBER OF CREDIT			9	0	0	0	0	0	4	5	

	5.5. Big Data Analysis											
				SEMESTER								
NO.	CODE	COURSE NAME	CREDIT	1	2	3	4	5	6	7	8
1	IK505	Data Mining and Warehouse	3						√		
2	IK515	Computational Statistics	2						√		
3	IK525	Decision Support System	3						√		
4	IK535	Data Visualization	2						√		
5	IK545	Big Data Platforms	2							√	
6	IK555	Data Analysis	2							√	
7	IK565	Time Series Data Analysis	2							√	

8	IK575	Data Management	2							√	
9	IK585	Financial Technology	3							√	
		NUMBER OF CREDIT	**9**	0	0	0	0	0	5	4	0
	5.6. Information System											
				SEMESTER							
NO.	**CODE**	**COURSE NAME**	**CREDIT**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
1	IK506	Information Technology Strategic Planning	3						√		
2	IK516	Architecture and Integration Enterprise Application	2						√		
3	IK526	Information System for Accounting	2						√		
4	IK536	Information System for Education	3						√		
5	IK546	Information System Audit	2							√	
6	IK556	IT Infrastructure and Emerging Trends	2							√	
7	IK566	Business Intelligence	2							√	
8	IK576	Application Systems for Business Functions	2							√	
9	IK586	Geographic Information System	3							√	
		NUMBER OF CREDIT	**9**	0	0	0	0	0	5	4	0

	6. Field Experience Program Courses (MKPPL)											
				SEMESTER							
NO.	**CODE**	**COURSE NAME**	**CREDIT**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
1	IK590	Internship	4								√
		NUMBER OF CREDIT	**4**	0	0	0	0	0	0	0	4
		Total	**146**	20	23	20	20	21	18	14	10