



ASIIN Seal

Accreditation Report

Bachelor's Degree Programmes

Physics Education

Physics

Mathematics Education

Mathematics

Provided by

Universitas Negeri Padang

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A About the Accreditation Process

Name of the degree programme (in original language)	(Official) English translation of the name	Labels applied for ¹	Previous accreditation (issuing agency, validity)	Involved Technical Committees (TC) ²
Program Studi Pendidikan Fisika	Physics Education	ASIIN	/	13
Program Studi Fisika	Physics	ASIIN	/	13
Program Studi Pendidikan Matematika	Mathematics Education	ASIIN	/	12
Program Studi Matematika	Mathematics	ASIIN	/	12
<p>Date of the contract: 22.05.2020</p> <p>Submission of the final version of the self-assessment report: 26.04.2021</p> <p>Date of the onsite visit: 06.-08.07.2021</p> <p>Via videoconference</p>				
<p>Peer panel:</p> <p>Prof. Dr. Thomas Trefzger, University of Würzburg</p> <p>Prof. Dr. Martin Pieper, Aachen University of Applied Sciences</p> <p>Prof. Dr. Carsten Westphal, Technical University of Dortmund</p> <p>Alexandra Dreiseidler, previously Emil-Fischer-Gymnasium Euskirchen</p> <p>Fiorentina Farah Medina, Student at Universitas Airlangga</p>				
<p>Representative of the ASIIN headquarter: Jan Philipp Engelmann</p>				
<p>Responsible decision-making committee: Accreditation Commission</p>				

¹ ASIIN Seal for degree programmes.

² TC: Technical Committee for the following subject areas: TC 12 - Mathematics; TC 13 - Physics.

<p>Criteria used:</p> <p>European Standards and Guidelines as of May 15, 2015</p> <p>ASIIN General Criteria, as of December 10, 2015</p> <p>Subject-Specific Criteria of Technical Committee 12 – Mathematics as of December 9, 2016</p> <p>Subject-Specific Criteria of Technical Committee 13 – Physics as of March 20, 2020</p>	
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B Characteristics of the Degree Programmes

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
Program Studi Pendidikan Fisika	Sarjana Pendidikan (S. Pd.) Bachelor of Education	–	6	Full time	–	8 Semesters	147 SKS ≈ 266 ECTS	Yearly 1965
Program Studi Fisika	Sarjana Sains (S. Si.) Bachelor of Science	Electronics and Instrumentation; Geophysics; Biophysics and Materials; Theoretical and Computational Physics	6	Full time	–	8 Semesters	147 SKS ≈ 266 ECTS	Yearly 1997
Program Studi Pendidikan Matematika	Sarjana Pendidikan (S. Pd.) Bachelor of Education	–	6	Full time	–	8 Semesters	146 SKS ≈ 264 ECTS	Yearly 1954
Program Studi Matematika	Sarjana Sains (S. Si.) Bachelor of Science	–	6	Full time	–	8 Semesters	145 SKS ≈ 262 ECTS	Yearly 1997

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

“Mission of the Department of Physics

1. To form a whole human being who is religious, pious, knowledgeable and technologically literate.
2. To carry out the Tri Dharma (Three Pillars) of Higher Education to produce graduates who have good scientific abilities and are able to face a future full of changes and technological sophistication.

³ EQF = The European Qualifications Framework for lifelong learning

3. To develop research groups in the Physics Department in carrying out the dharma of research in order to be able to carry out research in physics education and basic research in the field of physics and its application in an integrated national and regional level.
4. To develop teaching models of physics for science and technology (IPTEKS).
5. To strive for physics to be known and appreciated by all levels of society in the application of physics learning models and the application of physics for the welfare of society in order to carry out community service.

Program Educational Objectives (PEO)

The PEO formulation for the Physics Education Study Programme is producing physics education graduates in the field of physics education (teachers, assistant lecturers, assistant researchers, and assistant educational consultants) and entrepreneurs with the following characteristics:

1. Applying knowledge of physics education, scientific methods to solve problems in their career (PEO1).
2. Showing critical and creative thinking skills to solve problems in their work (PEO2).
3. Showing an ethical managerial, leadership, collaborative, and communicative attitude to develop themselves in support of their work (PEO3).
4. Developing abilities by applying the principles of lifelong learning through further studies. (PEO4).”

For the Bachelor’s degree programme Physics the institution has presented the following profile on the website:

“Mission of the Department of Physics

1. To form a whole human being who is religious, pious, knowledgeable and technologically literate.
2. To carry out the Tri Dharma (Three Pillars) of Higher Education to produce graduates who have good scientific abilities and are able to face a future full of changes and technological sophistication.
3. To develop research groups in the Physics Department in carrying out the dharma of research in order to be able to carry out research in physics education and basic research in the field of physics and its application in an integrated national and regional level.
4. To develop teaching models of physics for science and technology (IPTEKS).

5. To strive for physics to be known and appreciated by all levels of society in the application of physics learning models and the application of physics for the welfare of society in order to carry out community service.

Program Educational Objectives (PEO)

The PEO formulation for the Physics Study Programme is producing graduates who can work professionally such as lecturers, physicists, novice researchers, managers of physics institutes, entrepreneurs, and experts who are honest, responsible and have integrity and are able to apply knowledge, skills and competence in their professional tasks, with the following characteristics:

1. Being able to apply knowledge of physics, scientific methods, in solving problems faced in professional tasks. (PEO1).
2. Having the ability to develop knowledge in further studies, both formal and informal. (PEO2).
3. Having the ability to implement physics and technology, according to their expertise based on scientific principles, procedures and ethics. (PEO3).
4. Having the ability to communicate their ideas verbally and in writing, either scientifically or popularly, and are able to take appropriate initiatives, and lead work in relevant fields. (PEO4)."

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

"Mission of the Department of Mathematics

Upgrade:

1. Faith and devotion to God
2. Noble Character, Discipline and Responsibility
3. Conducive Academic Climate
4. The quality of graduates of educational and scientific staff
5. The role as a lifelong facilitator
6. Graduates who are able to communicate effectively with community members
7. Collaboration with other parties in the field of research and community service
8. Research in the field of mathematics and learning
9. Earthing of mathematics

The Programme Educational Objectives (PEO)

Produce a Bachelor of Mathematics Education who early in his career can use the knowledge and skills acquired as a problem solver to become:

1. Professional staff who excel in the field of education (PEO 1).
2. Individuals who can develop themselves through professional education programs, further study and lifelong learning (PEO 2).
3. Individuals who can demonstrate honesty, etiquette, responsibility, communicate their scientific ideas, take the initiative, and have a leadership spirit in their field (PEO 3).”

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

“Mission of the Department of Mathematics

Upgrade:

1. Faith and devotion to God
2. Noble Character, Discipline and Responsibility
3. Conducive Academic Climate
4. The quality of graduates of educational and scientific staff
5. The role as a lifelong facilitator
6. Graduates who are able to communicate effectively with community members
7. Collaboration with other parties in the field of research and community service
8. Research in the field of mathematics and learning
9. Earthing of mathematics

Objectives and Learning Outcomes

The objective of the degree programme is mainly referred to level 6 standard from Indonesia Qualification Framework (IQF) and guidelines from Indonesian Mathematical Society (IndoMS). IQF Degree Program on Level 6 is as follows:

1. Able to apply their expertise and use science, technology and/or the art of problem solving in the field and able to adapt faced situations. (6.1)
2. Master theoretical concepts in general knowledge and theoretical concepts in a specialized field in-depth as well as able to formulate a procedural problem solving. (6.2)
3. Able to take the right decisions based on the analysis of information and data, and able to provide guidance in selecting various alternative solutions independently and in a group. (6.3)
4. Have responsibility for his/her own accountable work. (6.4)

The Programme Educational Objectives (PEO)

The Program Education Objectives (PEO) is to produce a bachelor of science in mathematics that has mathematics and application competencies, possess good soft skill, emotional and spiritual quotient whose characteristics:

1. Able to applied mathematics and its way of thinking to solve real-world problems. (PEO 1)
2. Adaptable to science and technology development and continuously self-develop in mathematics and other related subjects. (PEO 2)
3. Communicative, collaborative, and have scientific ethics and patriotism. (PEO 3)”

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
- Objective-module matrices
- Academic Handbook of the Faculty of Mathematics and Natural Sciences
- Website
- Discussions during the audit

Preliminary assessment and analysis of the peers:

The auditors base their assessment on the learning outcomes as detailed in the Self-Assessment Report of the four Bachelor's degree programmes under review. They refer to the Subject-Specific Criteria (SSC) of the Technical Committees Mathematics (12) and Physics (13) as a basis for judging whether the intended learning outcomes of the degree programmes as defined by Universitas Negeri Padang (UNP) correspond with the competences outlined by the SSC.

The university has described and published programme educational objectives (PEOs) and programme learning outcomes (PLOs) for each of the four degree programmes. While the PEOs are developed based on the vision and mission of the university as well as the respective faculty and department and are rather general and concise, the PLOs describe in greater detail the competences, which the students should acquire during their studies. The PEOs and PLOs are contained in the faculty's Academic Handbook and published on the website of the degree programmes. They are thus well-anchored and accessible for students as well as for all other stakeholders.

According to the PEOs and PLOs as well as the discussions during the on-site visit, the peers understand that graduates of the Physics Education programme should be qualified for a job as a physics teacher in junior or senior high school, a researcher in physics education, an educational consultant or an entrepreneur in the field of education. For these different profiles, they are supposed to acquire social, pedagogical, scientific, management and business skills. Graduates of the programme should be able to solve physical problems using mathematical and scientific methods, manage learning process in physics, work effectively in teams and communicate orally and in writing.

The objective of the Physics programme is for its graduates to be able to work as lecturers, researchers or entrepreneurs. They should have the competences to apply their knowledge of physics and scientific methods in general to solving problems in their respective profession, be it in physics or in an interdisciplinary field. Graduates should be able to collect and analyse data, competently use IT and communicate to a scientific audience.

Graduates of the Mathematics Education programme should mainly be able to work as high school teachers, researchers and learning media developers. The skills they need for these occupations encompass solving simple mathematical problems, designing innovative learning processes and adequate media, conducting research in mathematics education and communicating effectively both orally and in writing.

The Mathematics programme shall qualify its graduates to work as actuaries, data analysts, researchers, programmers or entrepreneurs. They should have acquired the competences to create and solve simple mathematical problems under supervision, to prove simple mathematical statements, to use IT for problem-solving, to analyse data and to think critically and systematically.

The peers are convinced that UNP has laid down objectives and learning outcomes for all four degree programmes under review that are both well written and realistic. They cover all aspects that are to be expected from a programme in the respective field and clearly aim at enabling the students to take up an adequate job after graduation. The students and alumni confirm this impression during the audit. They emphasise that the competences they acquire in the programmes are not only useful for working as a teacher or researcher, but also open up many opportunities in private companies as well as in government agencies. This refers to analytical thinking as well as skills in communication and (learning) media development. The representatives of employers (schools, government agencies, private companies) also stress that the graduates' qualification profile is adequate to a broad range of occupations. They are well qualified due to their subject-related competences as well as their general skills in communication, collaboration and education.

The peers learn that UNP has established a defined process to regularly revise the objectives, learning outcomes and curricula of the programmes. This process relies on yearly tracer studies of the graduates' success at the labour market and of the competences they have acquired compared to the skills that are demanded. Moreover, UNP considers the results of internal SWOT analyses, potential changes in government regulations and the needs of stakeholders as enquired through regular surveys and meetings. This revision process takes place every five years. The representatives of schools and the private sector confirm that they are actively involved in these processes, which the peers appreciate.

In summary, the peers are convinced that the intended objectives and learning outcomes of the four undergraduate programmes under review allow graduates to take up an occupation, which corresponds to their qualification. The peers agree that the qualification objectives of all programmes adhere to level 6 of the European Qualification Framework, which relates to Bachelor's programmes, and to the respective ASIIN Subject-Specific Criteria of the Technical Committees 12 and 13, respectively. They aim at the acquisition of subject-specific competences and are generally formulated clearly and precisely.

Criterion 1.2 Name of the degree programme

Evidence:

- Self-Assessment Report
- Diploma Supplements

Preliminary assessment and analysis of the peers:

The titles of the degree programmes follow the rules for naming study programmes set by the Indonesian Ministry of Education. The peers agree that the names of all four degree programmes adequately reflect their intended aims and learning outcomes.

Criterion 1.3 Curriculum

Evidence:

- Study plans of the degree programmes
- Module descriptions
- Objective-module matrices
- Website
- Discussions during the audit

Preliminary assessment and analysis of the peers:

The curricula of the degree programmes are designed to comply with the programme objectives and learning outcomes and they are subject to constant revision processes (cf. chapter 1.1). As such, the curricula are reviewed regularly by students and teachers as well as external stakeholders such as alumni or partners from schools and the private sector. Regular changes are made to ensure that the curricula are up to modern standards. During the audit, the programme coordinators give some examples for changes that have been made during the last revision process, such as the creation of the modules “Classical Physics Experiments” and “Modern Physics Experiments” in the Physics Education programme to combine practical elements, which had formerly been spread out over various courses.

All degree programmes contain courses that are compulsory for the entire university, for the Faculty of Mathematics and Natural Sciences, for the individual programme as well as elective courses. Mandatory university courses include education in Pancasila, the constitutional principles of Indonesia, in religion, civic education, as well as the Indonesian and English language, which are taught in the first two semesters. They also include a community service and an internship programme during the later course of the studies. All students at the faculty have to take basic courses on calculus, physics, chemistry and biology, which are located in the first two semesters and which aim at providing basic scientific knowledge for the students.

These compulsory university and faculty modules lead to a relatively high amount of non-mathematical or non-physical courses, respectively. Since the students and alumni are happy with this feature of the programmes and emphasise that they consider these courses useful with regard to their general education as well as their later jobs, the peers do not criticise it. Regarding the mandatory community service, the peers learn that there are certain regulations on a university level on what the students can do, but that they still have many options. Particularly in the education programmes, they often design learning media on certain matters for schools or aim to communicate research findings to a broader audience. In the peers’ opinion, this is useful for both the students’ skills and the Indonesian society.

Besides the mentioned general courses, the Physics Education programme teaches the students the basics in mathematics and physics, which they need for their further studies, in the first two semesters. From the third to seventh semester, the students take courses in the different fields of physics, such as mechanics, thermodynamics, quantum physics or solid-state physics, as well as a number of modules in education. These include topics such as curriculum design, teaching and learning material, examination and learning strategy. The students practice teaching at school in two modules during the fifth and seventh se-

mester. During the last three semesters of their studies, they can specialise on certain aspects of physics or education through a number of elective courses. The final project should be based on the knowledge about research methodology that the students acquire in various modules, particularly in the sixth semester.

The curriculum of the Physics programme is identical to Physics Education in the first two semesters and similar afterwards regarding the physics modules, internship and thesis. However, instead of the education courses it contains more modules in physics that give the students a deeper understanding in various fields such as electronics and optics. A module in “Disaster Instrumentation” is also mandatory to account for the constant threat of natural disasters such as earthquakes and tsunamis in Indonesia, particularly in West Sumatra. Moreover, there is a larger amount of electives and the students also choose a concentration in “Electronics and Instrumentation”, “Geophysics”, “Biophysics and Materials” or “Theoretical and Computational Physics”. This enables them to acquire specific competences in one of the mentioned fields for a Master’s degree programme or for a future job.

In the first two semesters, the students of the Mathematics Education programme take the mentioned general courses as well as basic courses in algebra, geometry, calculus and mathematical English. In the following semesters, they obtain skills in the different fields of mathematics, such as statistics, calculus, algebra or number theory. At the same time, they take education courses on curriculum and learning material design, educational research, instruction strategies and microteaching. In the sixth and eighth semester, they choose between various elective modules in different fields of mathematics. Through three school internship in the fifth, sixth and seventh semester, the students gain some practical teaching experience. The “Undergraduate Thesis Seminar” in the seventh semester prepares them for writing their theses, which they do in the same semester.

The Mathematics Programme is similarly structured, but contains more specialised mathematical modules, for instance in the fields of statistics and mathematical modelling, as well as a broader range of electives in analysis, algebra, statistics, financial mathematics and actuary, and modelling and computation. Furthermore, there is a mandatory internship in the sixth semester and the students are supposed to work on their thesis during the final semester.

The peers are generally satisfied with the curricula of all programmes, as they are well structured and the modules build on each other in a reasonable way, enabling the students to effectively reach the learning outcomes of the programmes. They particularly approve that there is a high ratio of practical courses, both with regard to experiments in the Physics programmes and to practical teaching exercises in the education programmes. As the students confirm, they feel well prepared for the challenges of the labour market, especially through these practical elements.

The peers praise that UNP has introduced courses on disaster mitigation, given the high danger of natural disasters in Indonesia. This refers to the mandatory module “Disaster instrumentation” in the Physics programme as well as the module “Disaster management”, which can be taken as an elective module in Physics and Physics Education. They learn that these courses have been introduced due to student requests and they agree that they cover crucial topics. Based on the feedback of the students and alumni, who emphasise their importance, the peers advise UNP to teach them even more on disaster management. They are of opinion that particularly the future teachers in both education programmes should know about disaster management in order to educate their pupils and to spread knowledge about natural disasters to the general public.

The peers note that despite biophysics being mentioned as one of the important fields within the Physics degree programme, there seems to be little substantial content. The specialisation “Biophysics and Materials” seems to be mostly concerned with materials and less with biophysics. Although they learn that some students conduct research projects in biophysics, they think that the labelling is not entirely adequate. Therefore, they would appreciate it if UNP either offers more courses in biophysics or changes the name of the specialisation to better reflect its contents. During the audit discussions, the peers also learn that the demand for the specialisation “Theoretical and Computational Physics” has declined. However, they do not understand whether this specialisation is still offered and ask UNP to clarify this. If it is no longer offered, it should not be mentioned in the official documents and on the website.

The peers are surprised that, according to the curriculum and the module handbook, linear algebra, for instance eigenvalues and eigenvectors, is not taught in the Physics programme. Since they consider it important for various fields of physics, such as quantum physics, they strongly recommend that UNP introduce linear algebra in this programme.

The peers discuss with the university the ways in which the students can improve their English proficiency. They learn that in both Physics programmes, there is a mandatory general English course, whereas students of both Mathematics programmes have to take the course “English for Mathematics” to familiarise them with the subject-specific English vocabulary and expressions. English-language literature is suggested in many modules additionally to literature in Bahasa Indonesia. The Mathematics programme will introduce an international class consisting of up to 25 students of each new cohort, for which the modules will be taught in English to improve the proficiency of both the students and the teaching staff. The peers appreciate these efforts, but think that they should still be strengthened. In their opinion, the use of English could generally be expanded within all programmes by teaching individual modules in English. Moreover, the concept of international

classes could be introduced in all programmes. This would also help to foster UNP's internationalisation efforts (cf. chapter 2.1).

Apart from these small issues, the peers are convinced that the curricula of all programmes enable the students to reach the learning outcomes aimed for.

Criterion 1.4 Admission requirements

Evidence:

- Self-Assessment Report
- Website
- Discussions during the audit

Preliminary assessment and analysis of the peers:

There are three different paths of admission into the programmes:

1. National Selection of Higher Education or University (Seleksi Nasional Masuk Perguruan Tinggi Negeri, SNMPTN), a national admission system, which is based on the academic performance during high school.
2. Joint Selection of Higher Education or University (Seleksi Bersama Masuk Perguruan Tinggi Negeri, SBMPTN). This national selection test is held every year for university candidates. It is a nationwide written test (subjects: mathematics, Bahasa Indonesia, English, physics, chemistry, biology, economics, history, sociology, and geography).
3. Independent Selection (Seleksi Penerimaan Mahasiswa Baru, SPMB): Students are selected based on a written test (similar to SBMPTN) specifically held by Universitas Negeri Padang for prospective students that haven't been accepted through SNMPTN or SBMPTN.

Generally, the number of applications is considerably higher than the number of admitted students. For the academic year 2020/21, the ratio of accepted applicants is 7.5 % for Mathematics Education, 19.4 % for Mathematics, 37.6 % for Physics Education and 55.1 % for Physics.

The admission website informs potential students in detail about the requirements and the necessary steps to apply for admission into the programmes. Since the rules are based on decrees by the ministry of education and on the university's written regulations, the peers deem them binding and transparent.

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

The peers thank UNP for providing additional information and documents regarding the addressed issues. They see that the course “Disaster Management” is already included in all degree programmes as an elective and that in the Physics Education programme there is an additional elective called “Physics Learning Based on Technology and Disaster”, which was not included in the original module handbook sent to the peers. Therefore, the students are able to gain sufficient knowledge on natural disasters and their mitigation.

Furthermore, the peers learn that the specialisation “Theoretical and Computational Physics” has been cancelled due to a lack of interest. The specialisation “Material Physics and Biophysics” currently contains only one course on biophysics, namely medical physics, but three more will be offered in the future. The peers appreciate this effort.

As UNP explains, linear algebra is taught in the course “Mathematical Physics 1” in the Physics programme and the particular topic of eigenvalues and eigenvectors under the headline “Linear equations and matrices”. The peers are of opinion that this is sufficient, but that it could be made clearer in the module descriptions.

The peers learn that UNP plans to expand the use of international classes as well as to use for literature and class material in English in all programmes, which is welcome in order to strengthen the English skills of lecturers and students. They encourage the university to pursue this path further.

The peers consider criterion 1 fulfilled.

2. The degree programme: structures, methods and implementation

Criterion 2.1 Structure and modules
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Evidence:

- Self-Assessment Report
- Study plans of the degree programmes
- Module descriptions
- Objective-Modules-Matrices
- UNP Academic Regulations

- Discussions during the audit

Preliminary assessment and analysis of the peers:

The programmes under review are designed for 4 years and the students need to achieve 145 (Mathematics), 146 (Mathematics Education), and 147 (Physics, Physics Education) SKS (Indonesian Credit Points) respectively. This is roughly equivalent to 229-232 ECTS (but cf. chapter 2.2 for the credit point system and the conversion into ECTS). Each semester is equivalent to 16 weeks of learning activities, including one week for midterm exams and one week for final exams.

Regarding the number of SKS, however, the peers notice that there are some inconsistencies in the documents. While the figures mentioned above are given for the entire programmes, they do not match the amount given in the module handbooks. If the credit points of all modules of the Physics Education programme are added, they equal 151, not 147. While the curricular overview mentions 145 SKS overall for the Mathematics programme, of which 115 are compulsory and 30 are elective courses, the module handbook contains 127 SKS of compulsory courses and does not clearly indicate how many SKS have to be obtained through elective courses. For the Physics programme, UNP gives a total of 147 SKS, but if all courses in the curricular overview (table 7 of the SAR) are considered, they add up to 153 SKS. Moreover, based on the audit discussions, the peers have the impression that not all courses are included in the printed module handbooks. This includes for instance the modules “Mathematics Learning Design”, “Evaluation of Mathematics Learning”, “Mathematics Learning Media” and “Community Internship”. The module descriptions are available on the website, but not in the printed module handbook. Therefore, UNP has to ensure that the information on modules, the awarded credit points and their status as either compulsory or elective is correct in all documents.

After analysing the module descriptions and the study plans, the peers confirm that all degree programmes under review are divided into modules and that each module is a sum of coherent teaching and learning units. All programmes contain adequate practical elements and allow the students to define individual focuses through broad ranges of electives (see chapter 1.3 for more detail).

As the data in the Self-Assessment Report shows, the average length of study is longer than four years (yearly averages since 2016: Physics Education: 4,67-5,13; Physics: 4,62-5,6; Mathematics Education: 4,46-4,7; Mathematics: 4,15-4,75). In contrast, the dropout rates are generally quite low. The peers as well as the students see no problems within the module structure that account for the prolonged study time. Rather, the peers suspect that there might be issues with the student workload, particularly regarding the theses (cf. chapter 2.2).

International Mobility

The Self-Assessment Report as well as the discussions make it very clear that international recognition is one of UNP's primary goals for the next years. The peers point out that international mobility, with regard to the lecturers as well as to the students, is a key factor in these efforts.

The peers learn that the university already provides some opportunities for students to conduct internships and study semesters abroad. There are Memorandums of Understanding with 33 universities worldwide, although with a certain focus on China, Japan and South-East Asia, partly regarding student exchange, partly regarding research collaboration. Based on these MoUs, students can study abroad for one semester or participate in an international research project for a certain time. For the education programmes, there is also the opportunity of a one-month teaching internship in other South-East-Asian countries. The students confirm that these different mobility options are adequately communicated via the website, social media and personally through their academic advisors.

UNP has defined a process for the recognition of achievements acquired at other universities as long as they are similar to those of the respective courses in the programme. In case they do not fit, the university still offers to include these achievements in the Diploma Supplement as additional competences. As the students confirm, there are no problems with this credit transfer system and suitable modules can be discussed in advance in order to ensure that they are recognised. The peers appreciate that, but are unable to find an official regulation for the recognition of external achievements in the documents. Therefore, they ask UNP to provide this regulation.

The peers appreciate the efforts undertaken by the university to foster student mobility. They remark, however, that the effective amount of mobility to other higher education institutions in Indonesia or abroad is still relatively low. For instance, in 2019 only 13 students of all programmes participated in any kind of student mobility. Furthermore, many of the stays abroad are quite short and all of them are restricted to South-East Asia and Japan. The peers emphasise that it is very useful for students to spend some time abroad already during their Bachelor's studies to improve their English proficiency, to get to know other educational systems, and to enhance their job opportunities. Therefore, they recommend that UNP strengthen their internationalisation effort and make the stays abroad, also outside of South-East-Asia, more attractive to students.

Criterion 2.2 Work load and credits
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Evidence:

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

Preliminary assessment and analysis of the peers:

Based on the National Standards for Higher Education of Indonesia (SNPT), all four degree programmes under review use a credit point system called SKS. According to the legal requirements, an undergraduate programme in Indonesia can have between 144 and 160 SKS, while the actual amount of the programmes under review is 145-147 SKS.

1 SKS of academic load is equivalent to 170 minutes per semester week. For lectures, tutorials and similar classes, this means 50 minutes of face-to-face activity, 60 minutes of structured tasks and 60 minutes of independent learning per semester week, whereas for seminars and similar forms of learning, it is 100 minutes face-to-face activity and 70 minutes of independent learning. For laboratory work, internships, community service etc., 1 SKS equals 170 minutes of the respective activity per semester week. The details and the students' total workload are described in the respective module descriptions. The peers acknowledge that a credit point system based on the students' workload is in place.

As UNP explains, 1 SKS (170 min x 14 weeks) is supposedly equal to 1.58 ECTS (1 ECTS = 25 hours). However, it appears as if mid-term and final exams are not included in this calculation. As mandatory parts of the modules, they have to be included in the workload and as a result, the workload per SKS should be higher and the conversion rate to ECTS different. Moreover, the number of ECTS is not included in all module descriptions, particularly not for the Mathematics programme, which has to be amended.

With the exception of the last two semesters, the workload is spread relatively evenly with each semester containing between 17 and 24 SKS according to the regular study plan. The workload of the last two (Mathematics Education, Physics Education) or the last (Mathematics, Physics) semester is markedly reduced to give the students enough time for their theses as well as to already start looking for a job. However, the effective number of SKS the students can take depends on their achievements in the previous semester. The peers are satisfied with the distribution of the workload and they see that there are no structural peaks.

On the one hand, the students report that their workload is generally acceptable and that they normally have enough time to prepare for the courses, do the assignments and learn for the exams. On the other hand, the peers detect that they need more than four years on

average to finish their studies, which may indicate that the workload is too high (cf. chapter 2.1). Furthermore, the students say that they need between six months and one year to finish their undergraduate theses. It is not clear to the peers how much time they spend on their theses during this period and how much on other activities. However, as has been mentioned, there are only few other courses in the last two semesters, so they suspect that the students spend most of their time on their theses. Therefore, they are not sure whether the SKS awarded for the theses adequately cover the actual student workload.

To ensure that the students can realistically finish their studies on time, it is necessary for UNP to establish a system to monitor the actual student workload in the individual modules, particularly regarding the undergraduate thesis. This could be integrated into the existing course evaluations by asking the students how much time they spend on each individual course.

Criterion 2.3 Teaching methodology

Evidence:

- Self-Assessment Report
- Module descriptions
- Discussions during the audit

Preliminary assessment and analysis of the peers:

The teaching and learning methods employed in each course are laid down in the module handbook. Through the Indonesian regulations on credit points (see chapter 2.2), an adequate balance between face-to-face activities and independent learning is ensured for all courses. In the programmes under review, various student-centred learning methods are utilised. According to the Self-Assessment Report, besides the regular lectures, for instance projects, practical experiments (in physics), and problem-based learning are used in some courses. Through various courses on research methodology and proposal writing, the students are prepared to work independently on their undergraduate thesis.

The peers notice that the teaching methods are not really described in the module handbooks. In some cases, they are completely omitted, in others the wording is so generic that they are not able to tell which methods the teaching staff use in these courses. The university points out, that this information is included in the lesson plan, which students receive in the first meeting of each course. However, the peers think that the teaching methods should be known to all students and stakeholders and therefore, in the sake of transparency, they ask UNP to describe the teaching methods in the module handbooks.

The peers appreciate that the university wants to use problem-based learning more, as they consider it helpful for them to learn how to apply the knowledge they acquired in practice. From the documents and the audit discussions, however, they get the impression that in both mathematical programmes this is only done in very few courses at the moment. Moreover, they are not sure whether the students have to solve problems in teams, which would strengthen their collaboration and communication skills. Consequently, the peers encourage the university to employ problem-based learning, particularly in teams, in more courses.

Criterion 2.4 Support and assistance

Evidence:

- Self-Assessment Reports
- Website
- Discussions during the audit

Preliminary assessment and analysis of the peers:

In order to support students in completing their studies on time with good achievements, the university and the faculty provide academic and personal support and assistance through various means. The main contact person for every student is their academic advisor, which is assigned to them in their first semester. An academic advisor shall help them develop an adequate schedule for their studies, choose electives according to their skills and interests and support them in case of academic and non-academic problems. The advisor also monitors their study progress and supports them if there are problems. Moreover, senior students provide academic assistance organised by student associations in each study programme. Through the e-learning website and academic portal, all necessary information is provided to the students.

Independent student associations for various purposes are supported financially and administratively. The university has established a centre for entrepreneurship to support students in founding start-ups based on their business ideas. For students with disabilities, most buildings are accessible through ramps and elevators. The administration takes care that classes that have students with disabilities are taught in rooms, which are accessible to them.

The peers conclude that there are enough resources available to provide individual assistance, advice, and support for all students. The support systems help the students to achieve the intended learning outcomes to complete their studies successfully.

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

The peers thank UNP for providing additional information and documents regarding the addressed issues. They see that the university has already revised the module descriptions and provided additional explanations, particularly concerning the mentioned inconsistencies. However, there is still no uniform conversion rate from SKS to ECTS, which UNP has to ensure for all programmes.

The peers are happy to learn that UNP has started to expand its network of partner universities beyond South-East Asia and encourage the university to further strengthen its offer of mobility programmes for students. They acknowledge that UNP has identified some external reasons why many students do not finish in time – such as side jobs and non-academic commitments –, but nonetheless they ask the university to systematically monitor the student workload for the individual courses to ensure that the awarded credit points are realistic.

The peers consider criterion 2 mostly fulfilled.

3. Exams: System, concept and organisation

Criterion 3 Exams: System, concept and organisation
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Evidence:

- Self-Assessment Report
- Module descriptions
- Exam regulations
- Exemplary written exams and final theses
- UNP Academic Regulations
- Regulation of the Rector No. 03/2017 concerning Academic Regulations concerning Assessment of Study Results at UNP

Preliminary assessment and analysis of the peers:

For the examination of the students' achievement, each course has to determine objectives, which support the achievement of the overall learning outcomes of the respective programme. Accordingly, each course must assess whether all defined learning outcomes stated in the module description have been achieved. For this purpose, Universitas Negeri Padang utilises various types of examination.

In each course, the students have to pass written mid-term and final examinations. These commonly feature short answers, essays, problem-solving or case-based questions as well as calculation problems. To be admitted to the final exam, the students have to attend at least 80 % of the classes. Additionally, according to the Self-Assessment Report, quizzes, tests, practical performances, assignments, small projects, portfolios and presentations are employed to assess the students' achievement of the learning outcomes. At the first meeting of a course, the students are informed about what exactly is required to pass the module. The final grade of each module is calculated based on the score of these individual kinds of assessment. The exact formula is given in the module handbook. UNP uses a grading system with the grades A, A-, B+, B, B-, C+, C, C-, D and E, where a D (equivalent to a Grade Point of 1) is necessary to pass a module. Students who score E, must repeat the entire course. For students with a C- or D, there is also the opportunity to repeat a course on a voluntary basis in order to improve their grade.

The peers are satisfied to hear that besides the written exams, there are other kinds of assessment to evaluate whether the students have attained the learning outcomes of the module. They learn that for instance in the microteaching courses practical teaching demonstrations are utilised as assessment methods. The peers emphasise the importance of such skills-based assessment methods and hope that these are employed whenever possible. However, the kinds of assessment that are utilised in each module are only very generally indicated in the module handbooks. For instance, these may enumerate a "task", a "project" or a "practicum" without further explanations. This makes it impossible for students to know what they can expect before taking the course. Therefore, the peers ask UNP to describe the examination methods in more detail in the module handbooks.

Each course spans 14 weeks, as well as one for the mid-term and one for the final exam. The former is usually held in the eighth or ninth week, the latter in the 18th week of the semester. This means that the students can use the 16th to review the course material and the 17th week to prepare for the final exams. The students emphasise that this schedule is quite useful for them, as it gives them enough time to adequately prepare for the final exams, which the peers appreciate. Due to this, the students are able to handle even a relatively high number of exams – usually 7-8 mid-term, 7-8 final exams and the smaller tests during the semester. As the peers learn during the audit, students who cannot attend an exam due to illness or other important reasons can take a catch-up exam. However, they cannot find any official rules about this in the Academic Regulations and therefore ask UNP to provide these rules; the same goes for disability compensation measures for exams, for instance more time, additional aid etc. When the grades of each course are published, students have the opportunity to object to the grade if they feel the assessment is incorrect.

The respective lecturer will then re-check whether the grade has been correctly determined.

Apart from the mentioned issues, the peers are satisfied with the regulations of exams in the four degree programmes. The students emphasise that the grading system is fair and transparent. The peers inspect a sample of examination papers and final theses and are satisfied with the general quality.

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

The peers thank UNP for providing additional information and documents regarding the addressed issues. They appreciate that the university has already started revising the module descriptions in order to describe the examination methods in more detail and encourage UNP to do this consequently for all programmes. The peers acknowledge that there are regulations in place for catch-up exams. Students who have attended the course but cannot participate in the final exams due to important reasons, are entitled to a catch-up exam, which is scheduled separately. Furthermore, they see that UNP has adopted special regulations for students with disabilities, which are supposed to mitigate the disadvantages that they face.

The peers consider criterion 3 fulfilled.

4. Resources

Criterion 4.1 Staff

Evidence:

- Self-Assessment Report
- Staff Handbook
- Study plans
- Module descriptions
- Discussions during the audit

Preliminary assessment and analysis of the peers:

At Universitas Negeri Padang, the staff members have different academic positions. There are professors, associate professors, assistant professors, and lecturers. The academic po-

sition of each staff member is based on research activities, publications, academic education, supervision of students, and other supporting activities. This relies on regulations by the Indonesian Ministry of Education that determines certain minimum credit points of experience for reaching the next level. For instance, an associate professor has to publish a certain number of research papers per year, whereas a full professor additionally has to publish at least one paper in a reputable international journal and also has to supervise a certain number of PhD projects.

There are 33 members of the teaching staff in the Physics Department (18 with PhD, 15 with a Master's degree) and 36 in the Mathematics Department (14 with a PhD, 22 with a Master's degree). The ratio between teaching staff and students is 1:27.7 in the mathematical programmes and 1:32 in the physical programmes. The regular teaching staff has permanent positions, while sometimes external experts are hired for certain tasks with limited contracts. As the students and the teachers emphasise, the number of teaching staff is sufficient for all four programmes. The peers agree with this assessment and appreciate that UNP has significantly increased the ratio of teaching staff with a PhD over the last years. This was mainly achieved by successfully encouraging the teaching staff with a Master's degree to pursue further qualification.

At the moment, there are only very few full professors in all programmes, while the majority of the teaching staff are assistant and associate professors. The university plans to considerably increase this number. However, the peers learn that the research requirements mentioned above constitute the most important bottleneck, since UNP has traditionally focussed on teaching rather than research. Therefore, providing research grants to assistant and associate professors is the most important measure currently to enable them to gather the needed experience to transition to higher ranks. The peers encourage UNP to pursue these measures further.

From the staff handbook, the peers detect that many staff members are already quite active in research and they learn that UNP is planning to focus more on research in the future. This is connected to a change in status, as UNP will be recognised as a public university with significant autonomy starting in 2022, which gives it more freedom to pursue its goals and particularly to strengthen research. Currently, all teaching staff has considerably more responsibilities in teaching than in research, but with this new status, it will be possible to increase the amount of time for research. UNP will also enjoy greater autonomy in their recruitment, allowing them to hire more staff that already have experience in research or even hold a PhD. As the peers learn, the majority of the teaching staff in the education programmes have some experience of teaching in junior or senior high schools and they still regularly collaborate with high schools in various projects. The peers appreciate this

close connection to schools and believe that it is helpful for the practical teaching skills of the students.

In summary, the peers confirm that the composition, scientific orientation and qualification of the teaching staff are suitable for successfully implementing and sustaining the degree programmes.

Criterion 4.2 Staff development

Evidence:

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

Preliminary assessment and analysis of the peers:

According to the Self-Assessment Report, Universitas Negeri Padang encourages the continuing professional development of its staff. For this purpose, various opportunities are provided. Lecturers can participate in training activities, workshops, language training, national and international conferences and research projects. New lecturers have to go through a comprehensive basic instructional skills training, where they learn practical teaching skills. External experts and visiting lecturers are regularly invited to give insights in scientific as well as educational matters.

All teaching staff are encouraged to study abroad or to participate in international research projects and conferences in order to enhance their knowledge, increase their English proficiency and to build international networks. For this purpose, the university informs about possible scholarships either from Indonesia itself or from foreign governments to support academic mobility. UNP also provides its own grants for international research cooperation, for instance with universities in Japan and Singapore in the programmes under review. There is an internship programme for lecturers to gather practical experience in industry for up to one semester, which aims at gaining additional competences and strengthening the connection to the professional world.

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 qualification programme at the university, their opportunities to further improve their didactic abilities and to spend some time abroad to attend conferences, workshops or seminars.

The peers consider the support mechanisms for the continuing professional development of the teaching staff adequate and sufficient.

Criterion 4.3 Funds and equipment

Evidence:

- Self-Assessment Report
- Videos and presentation of the facilities
- Discussions during the audit

Preliminary assessment and analysis of the peers:

The university and the faculty are mainly funded by the Indonesian government, through the tuition fees and through grants for research projects. The figures presented by the university show that the faculty's income is stable and the funding of the degree programmes is secured. The academic staff emphasise that from their point of view, all four undergraduate 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.

During the virtual on-site visit, the university especially presented the physics laboratories in detail through live-streams and additional explanations about the equipment. There are five learning laboratories used by students of Physics and Physics Education: Basic Physics, Electronics and Instrumentation, Computational Physics, Photography and Advanced Physics Laboratory. Furthermore, in Electronics, Geophysics and Materials and Biophysics, there is also equipment used for research that can also be utilised for thesis projects. The peers are very satisfied with the presented equipment, much of which was acquired over the last years. The quantity of the equipment allows the experiments to be conducted in small groups, which stimulates the students' learning process.

Lecture rooms, seminar rooms and libraries have been presented through videos in preparation of the audit. The peers are pleased with their equipment and condition. The libraries of the departments of physics and mathematics are equipped with the necessary subject-specific literature and via the central UNP library, students can access e-books and electronic papers through international databases such as ProQuest and EBSCO. The students are happy with the literature, the equipment and the opening hours.

In summary, the peer group judges the available funds, the technical equipment, and the infrastructure 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:

UNP did not comment on this part of the report. The peers consider criterion 4 fulfilled.

5. Transparency and documentation

Criterion 5.1 Module descriptions

Evidence:

- Module descriptions
- Website

Preliminary assessment and analysis of the peers:

The module descriptions for all four programmes have been published on the university's website and are thus accessible to the students as well as to all stakeholders. The peers observe that they contain information about the persons responsible for each module, the workload, the credit points awarded, the intended learning outcomes, the content, the applicability, the prerequisites, the examination requirements, the recommended literature, and details explaining how the final grade is calculated.

However, as has already been remarked in several chapters, some information is missing or insufficient. Apparently, not all courses are included in the printed module handbooks, although they might be presented on the website (see chapter 2.1). The number of SKS and the status of modules as compulsory or elective is not always consistent (see chapter 2.1). Sometimes, the amount of ECTS is not given (see chapter 2.2). The teaching and examination methods are described only insufficiently (see chapters 2.3, 3). Therefore, the peers ask the university to revise the module handbooks to address the mentioned issues. Moreover, some of the suggested literature is quite old and may not reflect the state of research, particularly in education.

Criterion 5.2 Diploma and Diploma Supplement

Evidence:

- Sample Transcript of Records for each degree programme
- Sample Diploma certificate for each degree programme

- Sample Diploma Supplement for each degree programme

Preliminary assessment and analysis of the peers:

The peers confirm that the students of all four degree programmes under review are awarded a Diploma and a Diploma Supplement after graduation. The Diploma consists of a Diploma Certificate and a Transcript of Records. The Diploma Supplement contains all necessary information about the degree programme. The Transcript of Records lists all courses that the graduate has completed, the achieved credit points, grades, and cumulative GPA.

Criterion 5.3 Relevant rules

Evidence:

- Self-Assessment Report
- Website

Preliminary assessment and analysis of the peers:

The peers confirm that the rights and duties of both Universitas Negeri Padang and the students are clearly defined and binding. The rules and regulations are published on the university's website in Bahasa Indonesia as well as in English and hence available to all stakeholders. However, as has been mentioned, the peers could not find official regulations about recognition of achievements, catch-up exams and disability compensation measures for exams. Therefore, they ask UNP to provide these. The students receive all relevant course material in the language of the degree programme at the beginning of each semester.

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

The peers thank UNP for providing additional information and the necessary regulations regarding the addressed issues. Concerning the module handbooks, as has been mentioned above, UNP has to ensure a uniform conversion rate from SKS to ECTS.

The peers consider criterion 5 mostly fulfilled.

6. Quality management: quality assessment and development

Criterion 6 Quality management: quality assessment and development

Evidence:

- Self-Assessment Report
- Data of PLO achievements, tracer studies and surveys
- Discussions during the audit

Preliminary assessment and analysis of the peers:

The peers learn that there is an institutional system of quality management aiming at continuously improving the degree programmes. This system relies on internal (SPMI) as well as external (SPME) quality assurance.

SPME focuses on national accreditation. Every degree programme and every Higher Education Institution in Indonesia has to be accredited by the national Accreditation Agency (BAN-PT). Universitas Negeri Padang as an institution as well as three of the degree programmes under review (Physics, Physics Education, Mathematics Education) have received the highest accreditation status (A), Mathematics the second-highest (B) from BAN-PT.

SMPI encompasses all activities focused on implementing measures for improving the teaching and learning quality at the university. At university level, responsibility for quality assurance lies with the rector and vice-rector for academic affairs, assisted by the quality assurance centre. Similar structures are in place at the faculty (dean/deputy dean, quality assurance group) and department (head, quality assurance unit) level. The QA activities are oriented towards the standards set by the Quality Standard Manual ratified in 2017. QA is conducted through standardised monitoring and evaluation processes and internal quality audits.

Monitoring by the quality assurance bodies is conducted at three points of each semester: at the beginning (lecture preparation), in the middle (lecture process) and at the end (analysis of final exam, achievement of course learning outcomes). At the end of each semester, the students fill out a survey about each course. Moreover, the internal quality audit is conducted. Afterwards, the results of these activities are summarised for each study programme and conclusions are drawn about potential improvements. The findings are collected on the faculty level. Furthermore, the university regularly carries out an alumni tracer study to find out about their job opportunities, the relevance of the skills they acquired in the programmes and other related issues.

The peers are generally satisfied with the quality assurance system established by UNP. Yet, it is not clear to them in which way the students are informed about the results of the course evaluations and the actions, which may have been taken based on these results. As they understand it, there are regular meetings with student associations, but it is important

that the students of the respective courses are informed about their feedback and about what will be improved on this basis. Therefore, the peers ask the university to clarify this.

The peers also discuss with UNP how the students as important stakeholders are involved in the decision-making processes. They learn that currently, their feedback is gathered through student associations, but they do not participate in the responsible bodies. UNP explains that this is due to their current status of limited autonomy and that it can be changed in 2022, once they are recognised as a public university with significant autonomy. Therefore, the peers recommended to generally strengthen the students' involvement in the constant development of the programmes, for instance by involving student representatives in the relevant decision-making bodies.

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

The peers thank UNP for providing additional information and documents regarding the addressed issues. They understand that according to the university's quality manual, the evaluation results and the follow-up plans are published through UNP's website.

The peers consider criterion 6 fulfilled and uphold their recommendation to strengthen student involvement in the development of the programmes.

D Additional Documents

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

1. Please clarify if and how the students (particularly the students of the respective courses) are informed about the results of the course evaluation and the measures that the university takes to improve the programmes.
2. Please clarify whether the concentration “Theoretical and computational physics” for the degree programme Physics is still offered.
3. Official regulations on the recognition of achievements acquired at other universities
4. Official regulations on catch-up exams due to illness or other important reasons
5. Disability compensation measures for exams

E Comment of the Higher Education Institution (02.08.2021)

The institution provided an extensive statement as well as the following additional documents :

- Manual of Quality of the Internal Quality Assurance System
- Overview of compulsory courses for the different specialisations in the Physics programme
- Regulation of Rector UNP No. 2 of 2022: Implementation guidelines of freedom to learn - independent campus
- Academic Regulation of UNP
- Disability Students Service Guide of UNP

F Summary: Peer recommendations (08.08.2021)

Taking into account the additional information and the comments given by UNP 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	With requirements	–	30.09.2027
Ba Mathematics Education	With requirements	–	30.09.2027
Ba Physics	With requirements	–	30.09.2027
Ba Physics Education	With requirements	–	30.09.2027

Requirements

- A 1. (ASIIN 2.2, 5.1) Ensure that there is a uniform conversion rate from SKS to ECTS in the module descriptions based on the total workload of the students.
- A 2. (ASIIN 2.2) Establish a system to monitor the actual student workload in the individual modules, particularly regarding the undergraduate thesis.

Recommendations

For all degree programmes

- E 1. (ASIIN 1.3) It is recommended to expand the use of English within the programmes.
- E 2. (ASIIN 2.1) It is recommended to further strengthen the university's internationalization efforts, concerning student exchange as well as research collaboration.
- E 3. (ASIIN 2.3, 3, 5.1) It is recommended to describe the teaching and examination methods in more detail in the module handbooks.

- E 4. (ASIIN 6) It is recommended to strengthen the students' involvement in the constant development of the programmes, for instance by involving student representatives in the relevant decision-making bodies.

For the degree programmes Mathematics and Mathematics Education

- E 5. (ASIIN 2.3) It is recommended to employ problem-based learning, particularly in teams, in more courses.

G Comment of the Technical Committees (06.09.2021)

Technical Committee 12 – Mathematics (06.09.2021)

Assessment and analysis for the award of the ASIIN seal:

The Technical Committee discusses the procedure and agrees with the assessment of the peers.

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	With requirements	–	30.09.2027
Ba Mathematics Education	With requirements	–	30.09.2027

Technical Committee 13 – Physics (06.09.2021)

Assessment and analysis for the award of the ASIIN seal:

The Technical Committee discusses the procedure and largely agrees with the peers. However, it concludes that requirement A2 is not worded as clearly as it could be. The TC sees the need to differentiate between the time frame of the theses and the general question of how the student workload is monitored. As the former appears to be problematic, it should stay a requirement, whereas the latter should be reframed as a recommendation. Furthermore, the TC agrees that the adequate description of teaching and particularly examination methods in the module descriptions is so important that the recommendation E3 should become a requirement.

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

Degree Programme	ASIIN-seal	Subject-specific label	Maximum duration of accreditation
Ba Physics	With requirements	–	30.09.2027
Ba Physics Education	With requirements	–	30.09.2027

Requirements

- A 1. (ASIIN 2.2, 5.1) Ensure that there is a uniform conversion rate from SKS to ECTS in the module descriptions based on the total workload of the students.
- A 2. (ASIIN 2.2) Ensure that the thesis can be conducted within a time frame consistent with the awarded credit points.
- A 3. (ASIIN 2.3, 3, 5.1) Describe the teaching and examination methods consistently in more detail in the module handbooks.

Recommendations

For all degree programmes

- E 1. (ASIIN 1.3) It is recommended to expand the use of English within the programmes.
- E 2. (ASIIN 2.1) It is recommended to further strengthen the university's internationalization efforts, concerning student exchange as well as research collaboration.
- E 3. (ASIIN 2.2) It is recommended to establish a system to monitor the actual student workload in the individual modules.
- E 4. (ASIIN 6) It is recommended to strengthen the students' involvement in the constant development of the programmes, for instance by involving student representatives in the relevant decision-making bodies.

H Decision of the Accreditation Commission (17.09.2021)

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

The Accreditation discusses the procedure and agrees with the assessment of the peers and the amendments by the Technical Committee 13. Furthermore, it considers the university's efforts to strengthen problem-based learning laudable and therefore only encourages UNP to pursue this further.

The Accreditation Commission decides to award the following seals:

Degree Programme	ASIIN-seal	Subject-specific label	Maximum duration of accreditation
Ba Mathematics	With requirements	–	30.09.2027
Ba Mathematics Education	With requirements	–	30.09.2027
Ba Physics	With requirements	–	30.09.2027
Ba Physics Education	With requirements	–	30.09.2027

Requirements

- A 1. (ASIIN 2.2, 5.1) Ensure that there is a uniform conversion rate from SKS to ECTS in the module descriptions based on the total workload of the students.
- A 2. (ASIIN 2.2) Ensure that the thesis can be conducted within a time frame consistent with the awarded credit points.
- A 3. (ASIIN 2.3, 3, 5.1) Describe the teaching and examination methods consistently in more detail in the module handbooks.

Recommendations

For all degree programmes

- E 1. (ASIIN 1.3) It is recommended to expand the use of English within the programmes.

- E 2. (ASIIN 2.1) It is recommended to further strengthen the university's internationalization efforts, concerning student exchange as well as research collaboration.
- E 3. (ASIIN 2.2) It is recommended to establish a system to monitor the actual student workload in the individual modules.
- E 3. (ASIIN 6) It is recommended to strengthen the students' involvement in the constant development of the programmes, for instance by involving student representatives in the relevant decision-making bodies.

For the degree programmes Mathematics and Mathematics Education

- E 4. (ASIIN 2.3) The university's efforts to strengthen problem-based learning are appreciated and it is recommended to pursue these further.

I Fulfilment of Requirements (23.09.2022)

Analysis of the peers and the Technical Committees 12 - Mathematics and 13 – Physics (12.09.2022)

Requirements

For all degree programmes

- A 4. (ASIIN 2.2, 5.1) Ensure that there is a uniform conversion rate from SKS to ECTS in the module descriptions based on the total workload of the students.

Initial Treatment	
Peers	fulfilled Justification: UNP has adjusted the workload formula to clarify the conversion rate from SKS to ECTS and has revised the module descriptions accordingly.
TC 12	fulfilled Vote: unanimous Justification: The TC agrees with the opinion of the peer panel.
TC 13	fulfilled Vote: unanimous Justification: The TC agrees with the opinion of the peer panel.

- A 5. (ASIIN 2.2) Ensure that the thesis can be conducted within a time frame consistent with the awarded credit points.

Initial Treatment	
Peers	fulfilled Justification: UNP lays down all steps connected to the students' thesis work. The overall workload is calculated to be 272 hours. Since UNP faces problems to determine at which stage of the process students struggle, they introduced a system to monitor the students' progress step by step. This enables UNP to determine at which stage students cannot keep up with their schedule. With the gathered information, UNP can support their students during their thesis work. Students also profit from the new system directly, since they receive live feedback and can adjust their schedule. This will overall help students to conduct their thesis in the given time frame and will help to identify peak loads.
TC 12	fulfilled Vote: unanimous Justification: The TC agrees with the opinion of the peer panel.
TC 13	fulfilled Vote: unanimous Justification: The TC agrees with the opinion of the peer panel.

- A 6. (ASIIN 2.3, 3, 5.1) Describe the teaching and examination methods consistently in more detail in the module handbooks.

Initial Treatment	
Peers	fulfilled Justification: UNP has provided revised module descriptions. They now contain consistent information about the applied teaching and examination methods.
TC 12	fulfilled Vote: unanimous Justification: The TC agrees with the opinion of the peer panel.
TC 13	fulfilled Vote: unanimous Justification: The TC agrees with the opinion of the peer panel.

Decision of the Accreditation Commission (23.09.2022)

The accreditation commission discusses the procedure and follows the assessment of the peers and the technical committees 12 and 13.

The Accreditation Commission decides to award the following seals:

Degree programme	ASIIN-label	Subject-specific label	Accreditation until max.
Ba Physics Education	All requirements fulfilled		30.09.2026
Ba Physics	All requirements fulfilled		30.09.2026
Ba Mathematics Education	All requirements fulfilled		30.09.2026
Ba Mathematics	All requirements fulfilled		30.09.2026

Appendix: Programme Learning Outcomes and Curricula

According to the programme website, the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the Bachelor's degree programme Physics Education:

Program Educational Objectives (PEO)

The PEO formulation for the Physics Education Study Programme is producing physics education graduates in the field of physics education (teachers, assistant lecturers, assistant researchers, and assistant educational consultants) and entrepreneurs with the following characteristics :

1. Applying knowledge of physics education, scientific methods to solve problems in their career (PEO1).
2. Showing critical and creative thinking skills to solve problems in their work (PEO2).
3. Showing an ethical managerial, leadership, collaborative, and communicative attitude to develop themselves in support of their work (PEO3).
4. Developing abilities by applying the principles of lifelong learning through further studies. (PEO4).

Program Learning Outcomes (PLO)

PLO for the Physics Education Study Programme is to produce physics education graduates who are able to :

1. Implement knowledge of the concepts of classical physics and modern physics through identification of the physical properties of a physical system (PLO1).
2. Apply mathematical methods to explain, describe, analyse, and solve physics problems (PLO2).
3. Solve problems of a standard physical system comprehensively using the basic principles of physics, mathematical equations, and computing / ICT tools (PLO3).
4. Analyse physics materials using scientific methods, problem-based learning, or other relevant methods (PLO4).
5. Use creative ideas to solve physics, physics education, and interdisciplinary problems related to physics (PLO5).
6. Carry out experiments in physics or other fields related to physics, and can process, analyse, and interpret the data obtained (PLO6).

7. Apply fields of natural science and other educational sciences relevant to physics and physics education to broaden their horizons (PLO7).
8. Apply their knowledge in physics and physics education to manage physics learning and analyse new trends in physics education (PLO8).
9. Increase knowledge and skills that can be used to continue their studies to a higher level of education (PLO9).
10. Apply soft skills, ethics, and management functions in group work, group discussions and group experiments in the physics laboratory (PLO10).
11. Communicate orally and in writing scientific reports and scientific publications in physics education using an appropriate writing format and upholding scientific ethics (PLO11).

The following **curriculum** is presented:

No	Semester 1	Credits	Semester 2	Credits	Semester 3	Credits	Semester 4	Credits
1	General Physics	4	General Chemistry	4	Mathematical Physic 2	3	Basic Electronics 2	3
2	Calculus for Physics	3	General Biology	4	Basic Electronics 1	3	Thermodynamics	3
3	Electronics Instruments and Measurement	3	Basic Physics	4	Algorithm and Computer Programming	3	Electricity and Magnetism	3
4	Statistics for Physics Education	3	Mathematical Physic 1	3	Mechanics	3	Evaluation of Learning Physics	3
5	Religion Education	3	Citizenship Education	2	Modern Physics	3	Physics Learning Media	3
6	Pancasila Education	2	Educational Psychology	2	Middle School Physics Curriculum	3	English	2
7	Basic Education of	2	Indonesian	2	Counselling guidance	2	Elective (UNP)	2
8					Entrepreneurship	3		
		20		21		23		19
No	Semester 5	Credits	Semester 6	Credits	Semester 7	SKS	Semester 8	Credits
1	Waves and Optics	3	Solid State Physics	3	Modern Physics Experiments	1	Final Project	6
2	Quantum Physics	3	Nuclear Physics	3	Analysis of Physics for Senior High School Class XII	3	(Elective 2)	2*
3	Statistical Physics	3	Research Methodology and Publication	3	Filed Experience programme 2 (PPL 2)	3	(Elective 3)	2*

4	Physics Learning Plan	3	Physics Learning Seminar	2	Real Work Lecture (KKN)	2	(Elective 4)	2*
5	Physics Learning Strategy	3	Practice Learning Physics	1	(Elective 1)	2*		
6	Analysis of Physics for Senior High School Class X	3	Classical Physics Experiments	1				
7	English for Physics Education	2	Analysis of Physics for Senior High School Class XI	3				
8	Filed Experience programme (PPL 1)	1	Elective 2	2				
			Administration and Supervision Education	2				
		21		20		11		12

According to the programme website, the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the Bachelor's degree programme Physics:

Program Educational Objectives (PEO)

The PEO formulation for the Physics Study Programme is producing graduates who can work professionally such as lecturers, physicists, novice researchers, managers of physics institutes, entrepreneurs, and experts who are honest, responsible and have integrity and are able to apply knowledge, skills and competence in their professional tasks, with the following characteristics:

1. Being able to apply knowledge of physics, scientific methods, in solving problems faced in professional tasks. (PEO1).
2. Having the ability to develop knowledge in further studies, both formal and informal. (PEO2).
3. Having the ability to implement physics and technology, according to their expertise based on scientific principles, procedures and ethics. (PEO3).
4. Having the ability to communicate their ideas verbally and in writing, either scientifically or popularly, and are able to take appropriate initiatives, and lead work in relevant fields. (PEO4).

Program Learning Outcomes (PLO)

PLO for the Physics Study Programme is to produce physics graduates who are able to :

1. Implement knowledge of the concepts of classical physics and modern physics through identification of the physical properties of a physical system (PLO1).
2. Apply mathematical methods to explain, describe the study programme, analyse, and solve physics problems. (PLO2).
3. Solve problems of a standard physical system comprehensively using the basic principles of physics, mathematical equations, computing / ICT tools. (PLO3).
4. Analyse physics material comprehensively by applying problem solving competencies and scientific methods in more depth. (PLO4).
5. Apply their knowledge in the field of physics to a broader field/ or interdisciplinary problems in their professional activities. (PLO5).
6. Carry out experiments in physics or other fields related to physics, and can process, analyse, and interpret the data obtained. (PLO6).
7. Apply the fields of natural science and other disciplines relevant to physics to broaden their horizons. (PLO7).
8. Apply their knowledge in physics to analyse new trends in physics and integrate relevant methodologies. (PLO8).
9. Increase their knowledge and continue their studies to a higher level of education. (PLO9).
10. Show adaptive and responsive ability to work effectively, creatively, both individually and in groups. (PLO10).
11. Communicate scientific papers both orally and in writing in accordance with scientific ethics. (PLO11).

The following **curriculum** is presented:

No	Semester 1	Credits	Semester 2	Credits
1	General Physics	4	General Chemistry	4
2	Calculus for Physics	3	General Biology	4
3	Electronics Instruments and Measurement	3	Basic Physics	4
4	Statistics for Physics	3	Mathematical Physic 1	3
5	Religion Education	3	Citizenship Education	2
6	Pancasila Education	2	English	2
7	(Elective UNP 1)	2*	Indonesian	2
		20		21
	Semester 3	Credits	Semester 4	Credits
1	Mathematical Physic 2	3	Basic Electronics 2	3

2	Basic Electronics 1	3	Thermodynamics	3
3	Algorithm and Computer Programming	3	Electricity and Magnetism	3
4	Mechanics	3	Computational Physics	3
5	Modern Physics	3	Physics of Earth and Astronomy	3
6	Biophysics	3	Applied Electronics	3
7	English for Physics	2	Disaster Instrumentation	2
8	Entrepreneurship	3	(Elective 1)	2*
9			(Elective 2)	2*
		23		20
No	Semester 5	Credits	Semester 6	Credits
1	Waves and Optics	3	Solid State Physics	3
2	Quantum Physics	3	Nuclear Physics	3
3	Statistical Physics	3	Research Methodology and Publication	3
4	Elective for Study field group1	3	Physics Seminar	2
5	Elective for Study field group 2	3	Modern and Photonic Optics	3
6	Elective for Study field group3	3	Elective for Study field group 4	3*
7			Elective for Study field group 5	3*
		18		20
	Semester 7	Credits	Semester 8	Credits
1	Radiation Physics	2	Undergraduate Thesis	6
2	Internship (PKL)	2	(Elective 7)	2*
3	Community Service Programme KKN)	2	(Elective 8)	2*
4	Elective 3	2*		
5	(Elective4)	2*		
6	(Elective 5)	2*		
7	(Elective 6)	2*		
	Elective for Study field group 6	3*		
		17		8
Faculty	University	Compulsory courses	Elective courses	Elective for Study field group (KBK)

According to the programme website, the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the Bachelor's degree programme Mathematics Education:

The Programme Educational Objectives (PEO)

Produce a Bachelor of Mathematics Education who early in his career can use the knowledge and skills acquired as a problem solver to become:

1. Professional staff who excel in the field of education (PEO 1).
2. Individuals who can develop themselves through professional education programs, further study and lifelong learning (PEO 2).
3. Individuals who can demonstrate honesty, etiquette, responsibility, communicate their scientific ideas, take the initiative, and have a leadership spirit in their field (PEO 3).

The Programme Learning Outcomes (PLO)

1. Graduates are able to recognize the formal structure of simple mathematical problems in basic mathematics and advanced mathematics to support the professional competence of teachers and further studies.
2. Graduates are able to design innovative learning based on the concept of mathematics education and learning.
3. Graduates are able to design mathematics learning media, both manipulative learning media and ICT-based learning media.
4. Graduates are able to design research in the field of mathematics education.
5. Graduates are able to use general knowledge concepts to support professional teacher competencies.
6. Graduates are able to produce innovative work, in the fields of education and entrepreneurship.
7. Graduates demonstrate oral and written communication skills.
8. Graduates are able to demonstrate skills / skills to use ICT.
9. Graduates can carry out innovative mathematics learning.
10. Graduates are able to show a responsible attitude in their own work and can be given responsibility for the achievement of group work.
11. Graduates are able to demonstrate good workplace and social ethics.

The following **curriculum** is presented:

No	Semester 1	Credits	Semester 2	Credits	Semester 3	Credits	Semester 4	Credits
1	Religion Study	3	Pancasila Education	2	Indonesian	2	Civic education	2
2	Educational psychology	2	Administratio n and Educational Supervision	2	Basics Edu- cational Science	2	Introduction of Counseling	2
3	Calculus	4	General biology	4	Plane and Spaces Geometry Analytic	4	Mathematics Instruction Strategies	3
4	General Physics	4	General Chemistry	4	Elementary Statistics	4	Abstract Algebra	4
5	Introduction Basic Mathematics	3	Plane and Space Geometry	3	Psychology of Mathematical Instructions	2	Vektor Calculus	4
6	Basic Algebra and Trigo- nometry	3	English for Mathematics	2	Elementary Linear Algebra	4	Study Middle School Math Curriculum	3
7	Computer application	2	Advanced Calculus	4	Number Theory	3	Algorithms and Programming	3
	Total	21	Total	21	Total	21	Total	21
No	Semester 5	Credits	Semester 6	Credits	Semester 7	Credits	Semester 8	Credits
1	English	2	Entrepreneurs hip	3	Schooling Field Practice 3	3	Community Internship	2
2	Schooling Field Practice 1	1	University Elective Courses	2*	Undergraduat e Thesis Seminar	2	Applied Regression Analysis	3*
3	Mathematics Learning Design	3	Schooling Field Practice 2	1	Undergraduat e Thesis	4	Multivariate Analysis	3*
4	Evaluation of Mathematics Learning	3	Micro Teaching	3	Sampling Technique	3	Finite Group Theory	3*
5	Mathematics Learning Media	3	Educational Research Methods and Teaching Mathematics	3			Introduction to Topology	3*
6	Mathematical Statistics 1	3	Introduction to Operations Research	3			Mathematical Statistics 2	3*
7	Ordinary Differential Equations	3	Real Analysis 1	3			TFV Complex 1	3*

	Discrete Mathematics	3	Geometry Transformation	3*			Mathematical Modeling	3*
9			Advanced Computer Applications	3*			Databases	3*
10			History of Mathematics	2*			Real Analysis 2	3*
11			Actuarial	3*			Numerical Method	3*
	Total	21	Total	29	Total	12	Total	32

Compulsory courses of university	Elective courses of university (minimum 2 credits)	Compulsory courses of faculty	Compulsory courses of study program	Elective courses of study program (minimum 8-9 credits)
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According to the programme website, the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the Bachelor's degree programme Mathematics:

Objectives and Learning Outcomes

The objective of the degree programme is mainly referred to level 6 standard from Indonesia Qualification Framework (IQF) and guidelines from Indonesian Mathematical Society (IndoMS). IQF Degree Program on Level 6 is as follows:

1. Able to apply their expertise and use science, technology and/or the art of problem solving in the field and able to adapt faced situations. (6.1)
2. Master theoretical concepts in general knowledge and theoretical concepts in a specialized field in-depth as well as able to formulate a procedural problem solving. (6.2)
3. Able to take the right decisions based on the analysis of information and data, and able to provide guidance in selecting various alternative solutions independently and in a group. (6.3)
4. Have responsibility for his/her own accountable work. (6.4)

The Programme Educational Objectives (PEO)

The Program Education Objectives (PEO) is to produce a bachelor of science in mathematics that has mathematics and application competencies, possess good soft skill, emotional and spiritual quotient whose characteristics :

1. Able to applied mathematics and its way of thinking to solve real-world problems. (PEO 1)
2. Adaptable to science and technology development and continuously self-develop in mathematics and other related subjects. (PEO 2)
3. Communicative, collaborative, and have scientific ethics and patriotism. (PEO 3)

The Programme Learning Outcomes (PLO)

1. Act according to Pancasila values.
2. Display scientific attitudes
3. Create simple realistic mathematical problem/solution under supervision.
4. Prove simple mathematical statements using concepts they are familiar with
5. Implement simple mathematical processes on the computer
6. Use Information technology as devices/tools to solve problems
7. Create effective communication and collaboration
8. Adapt and improve their quality continuously

9. Develop critical, creative, structured, and systematical thinking skill
10. Analyze information and data to make decision

The following **curriculum** is presented:

No .	Code	Courses	Credits
SEMESTER I			
1	UNP1.60.1401	Religion Education	3
2	UNP1.60.1402	Pancasila Education	2
3	UNP1.60.1403	Civics	2
4	UNP1.60.1404	Indonesian Language	2
5	UNP1.60.1405	English	2
6	UNP2.60.1401	Basic Natural Science	2
7	UNP2.60.1402	Basic Social Culture	2
8	FMA1.60.1302	Calculus	4
9	FMA1.60.1303	Fundamental of Physics	4
10	MAT1.62.1001	Analytic Geometry	3
11	MAT1.62.1002	Computer Applications	2
12	MAT1.62.1003	English for Mathematics	2
SEMESTER II			
1	UNP2.60.2101	Physical Education	2
2	UNP2.60.2102	Japanese Language	2
3	UNP2.60.2103	Multicultural of Education	2
4	UNP2.60.2401	National History of Indonesia	2
5	FMA1.60.1301	General Biology	4
6	FMA1.60.1304	Basic Chemistry	4
7	MAT1.62.2002	Advanced Calculus	4
8	MAT1.62.2003	Introduction to Foundation of Mathematics	3
SEMESTER III			
1	UNP1.60.3101	Entrepreneurship	3
2	MAT1.62.3001	Elementary Linear Algebra	4
3	MAT1.62.3002	Elementary Statistics	4
4	MAT1.62.3004	Vector Calculus	4
5	MAT1.62.3005	Discrete Mathematics	3
SEMESTER IV			
1	MAT1.62.4006	Transformational Geometry	3
2	MAT1.62.4001	Ordinary Differential Equation	4

3	MAT1.62.4002	Abstract Algebra	4	
4	MAT1.62.4003	Probability Theory	4	
5	MAT1.62.4004	Actuarial Mathematics	3	
6	MAT1.62.4005	Algorithm and Programming	3	
SEMESTER V				
1	MAT1.62.5001	Numerical Methods	3	
2	MAT1.62.5002	Real Analysis 1	3	
3	MAT1.62.5003	Mathematical Statistics	4	
4	MAT1.62.5004	Operational Research	4	
SEMESTER VI				
1	MAT1.62.6001	Real Analysis 2	3	
2	MAT1.62.6002	Mathematical Modelling	4	
3	MAT1.62.6003	Research Methods	2	
SEMESTER VII				
1	UNP1.60.7401	Community Service Program	2	
2	MAT1.62.7001	Complex Analysis	4	
3	MAT1.62.7002	Seminar	2	
SEMESTER VIII				
1	MAT1.62.8001	Undergraduate Thesis	4	
Study Program Elective Course				
Elective Courses "Analysis"				
No	Code	Courses	Credits	Semester
1	MAT2.62.5001	Theory of Differential Equations	3	V
2	MAT2.62.7001	Introduction to Topology	3	VII
3	MAT2.62.7002	Introduction to Functional Analysis	3	VII
4	MAT2.62.7012	Numerical Analysis	3	VII
5	MAT2.62.8001	Introduction to Measure Theory	3	VIII
6	MAT2.62.8002	Calculus of Variation	3	VIII
Elective Courses "Algebra"				
1	MAT2.62.5002	History of Mathematics	3	V
2	MAT2.62.5003	Number Theory	3	V
3	MAT2.62.6001	Linear Algebra	3	VI
4	MAT2.62.7003	Module Theory	3	VII
5	MAT2.62.8003	Finite Group Theory	3	VIII
Elective Courses "Statistics"				
1	MAT2.62.5004	Introduction to Stochastic Process	3	V
2	MAT2.62.5005	Sampling Techniques	3	V
3	MAT2.62.6002	Regression Analysis	3	VI
4	MAT2.62.6003	Multivariate Statistical Analysis	3	VI
5	MAT2.62.6004	Non Parametric Statistics	3	VI
6	MAT2.62.7004	Time Series Analysis	3	VII
7	MAT2.62.7005	Design of Experiment	3	VII

8	MAT2.62.7006	Linear Models	3	VII
9	MAT2.62.7007	Survival Analysis	3	VII
Elective Courses "Financial Mathematics and Actuary"				
1	MAT2.62.5006	Advanced Actuarial	3	V
2	MAT2.62.6005	Investment Management	3	VI
3	MAT2.62.7008	Life Insurance Company Operation	3	VII
4	MAT2.62.7009	Statistical Methods For Actuarial Sciences	3	VII
5	MAT2.62.8004	Developing Mortality Table	3	VIII
Elective Courses "Modelling and Computation"				
1	MAT2.62.5007	Partial Differential Equation	3	V
2	MAT2.62.6006	Graph Theory	3	VI
3	MAT2.62.6007	Introduction To Dynamical Systems	3	VI
4	MAT2.62.7010	Databases	3	VII
5	MAT2.62.7011	Mathematical Biology	3	VII
6	MAT2.62.8005	Game Theory	2	VIII
Additional Supporting Courses				
1	MAT2.62.5008	Management	3	V
2	MAT2.62.6008	Working/ Field Practice	3	VI
3	MAT2.62.8006	Organizational behavior	2	VIII
4	MAT2.62.8007	Mathematical Teaching	3	VIII
5	MAT2.62.8008	Managerial Accounting	3	VIII