



**CURRICULUM DOCUMENT
STUDY PROGRAMME: PHYSICS
EDUCATION**

**FACULTY OF MATHEMATICS, NATURAL SCIENCES AND
INFORMATION TECHNOLOGY EDUCATION
UNIVERSITAS PERSATUAN GURU REPUBLIK INDONESIA SEMARANG
2025**

DOCUMENT


Development of Higher Education Curricula

Physics Education Study Programme

Semarang, 2025

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Faculty : **Faculty of Mathematics, Natural Sciences
and Information Technology Education**

UNIVERSITAS PERSATUAN GURU REPUBLIK INDONESIA SEMARANG
Year 2025

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FOREWORD

We offer our deepest thanks and praise to the Almighty God for His grace and blessings, which have enabled the curriculum document for the Physics Education Study Programme at the Faculty of Mathematics, Natural Sciences and Information Technology, UPGRIS, to be compiled and refined. The compilation of this document forms part of the institution's commitment to ensuring the quality of higher education and addressing the challenges of an era that continues to evolve dynamically, particularly in the transition from the Fourth Industrial Revolution towards the *Society 5.0* era.

This curriculum document has been designed in accordance with various national regulations, such as Law No. 12 of 2012 on Higher Education, the National Standards for Higher Education (SN-Dikti), and refers to the Indonesian National Qualifications Framework (KKNI), and Ministry of Education, Culture, Research and Technology Regulation No. 53 of 2023 on Quality Assurance in Higher Education, subsequently updated by Ministry of Education, Culture, Research and Technology Regulation No. 39 of 2025. The curriculum is developed collaboratively and participatively, involving various stakeholders, including lecturers, students, alumni, employers, and partners from the business and industrial sectors (DUDI), to ensure alignment between graduate profiles, learning outcomes, and societal needs.

This curriculum not only emphasises the mastery of academic competencies in the fields of physics and education, but also the strengthening of character, 21st-century skills, digital literacy, and the ability to think critically, creatively, collaboratively, and communicatively. Through an *Outcome-Based Education* (OBE) approach and flexibility in off-campus learning delivery, students are expected to develop into adaptive, reflective, and contributory educators amidst rapid global change.

We would like to express our gratitude to the entire curriculum development team, lecturers, educational staff, and all parties who have contributed to the preparation of this document. We hope that this curriculum document will serve as the primary guide for the delivery of high-quality, relevant, and meaningful education for the entire academic community of the Physics Education Study Programme.

Semarang, September 2025

Dean of the Faculty of Mathematics, Natural Sciences and Information Technology
Universitas Persatuan Guru Republik Indonesia Semarang



Dr Supandi, S.Si., M.Si
NPP. 097401245



PROGRAMME IDENTITY

| No | Name of Higher Education Institution (HEI) | UNIVERSITAS PERSATUAN GURU REPUBLIK INDONESIA SEMARANG |
|----|--|---|
| 1 | Faculty/Postgraduate | Mathematics, Science, and Information Technology Education |
| 2 | Study Programme | Physics Education |
| 3 | Accreditation Status | Excellent |
| 4 | Level of Education | Bachelor's |
| 5 | Graduate Qualification | S.Pd |
| 6 | Academic Vision | To develop the academic discipline of physics education to produce graduates who excel in technology and possess a strong sense of identity |
| 7 | Number of Students | 64 |
| 8 | Number of Lecturers | 9 |
| 9 | Programme Address | Jl. Sidodadi Timur No. 24, Karangtempel, Semarang Timur District, Semarang City, Central Java 50232. |
| 10 | Tel | (024) 8316377 |
| 11 | Programme Website | https://fisika.upgris.ac.id |



1. Foundations of Curriculum Design and Development

1.1 University Values

In the Master Development Plan (RIP) of the UPGRIS, for the period 2015–2034, the UPGRIS, has established its long-term vision as *'The Meaning University'* a university that serves as **a provider, creator and guardian of the meaning of life**. This vision embodies the fundamental spirit of developing education that is not only academically excellent but also meaningful in terms of life values.

Furthermore, through the Rector's Decision of the UPGRIS, No. 013.a/SK/UPGRIS/II/2025, it was established that the university's value system (*University Value*) is one of **the learning outcomes for graduates of the Universitas Persatuan Guru Republik Indonesia Semarang**, namely: **"Demonstrating character and conduct that reflect adaptability, enthusiasm, and integrity as an expression of devotion to God Almighty."**

As part of the UPGRIS, **the Physics Education Study Programme** internalises these *university values* in all learning activities and in the character development of students. Furthermore, the study programme also incorporates distinctive values tailored to **the graduate profile attributes**, to cultivate professional, reflective, and transformative physics educators. These additional *values* include:

1. **Thinking logically, critically, and systematically** when solving physics, scientific, and educational problems.
2. **An open and collaborative attitude** when facing technological developments and modern pedagogical approaches.
3. **Upholding academic ethics and scientific integrity** in all teaching and research practices.
4. **A focus on meaningful learning**, using **physics learning** as a means to develop students' scientific reasoning, inquiry skills, and character.

Through the integration of *University Values* and the distinctive values of the programme, graduates of the Physics Education programme at the UPGRIS, are expected to become **educators of character, who are professional and adaptable to the challenges of the times**, whilst upholding the meaning of life in line with the vision of *The Meaning University*.



1.2 Philosophical Foundation

This foundation provides philosophical guidance at the stages of design, implementation, and improvement of educational quality (Ornstein & Hunkins, 2014). Curriculum development requires philosophy as a framework for thinking. Philosophical studies of the curriculum will seek to address the following issues: (1) how educational objectives should be formulated, (2) what educational content or material should be presented to students, (3) what educational methods should be used to achieve educational objectives, and (4) what roles lecturers and students should play.

1.3 Sociological Foundation

This foundation provides the basis for the development of the study programme curriculum within the UPGRIS as an educational framework comprising objectives, content, learning activities and a positive learning environment for the acquisition of learning experiences relevant to the personal and social development of learners (Ornstein & Hunkins, 2014:128). The study programme curriculum must be capable of transmitting culture from one generation to the next. Culture is understood as part of group knowledge (Ross, 1963: 85).

1.4 Psychological Foundations

The curriculum of the Physics Education Study Programme is formulated in accordance with the laws and regulations in force in Indonesia, which serve as the legal basis for the development of higher education. The primary legal foundations include Law No. 20 of 2003 on the National Education System, which states that education aims to develop the potential of learners so that they become people of faith, piety, knowledge, competence, creativity, and independence, and become democratic and responsible citizens.

Furthermore, the curriculum also refers to Law No. 12 of 2012 on Higher Education, particularly the articles emphasising the importance of academic development, lifelong learning, and the relevance of education to the needs of society and the world of work. This curriculum has been developed in accordance with the Indonesian National Qualifications Framework (KKNI), the National Standards for Higher Education (SN-Dikti), and curriculum guidelines based on *Outcome-Based Education* (OBE) as well as the fulfilment of study load requirements outside the degree programme.



1.5 Historical Foundation

The historical foundation constitutes the history used as the basis for the development of the curriculum at the UPGRIS. This is intended to ensure that the UPGRIS's curriculum is capable of facilitating student learning in line with the times. The curriculum developed by the UPGRIS, is capable of passing on the cultural values and golden history of past nations, and transforming them for the present era; a curriculum that prepares students to live better in the era of 21st-century change, play an active role in the Industry 4.0 era, and recognise the signs of the Industry 5.0 revolution

1.6 Legal Basis

1. Law of the Republic of Indonesia Number 14 of 2005 concerning Teachers and Lecturers (State Gazette of the Republic of Indonesia Year 2005 Number 157, Supplement to the State Gazette of the Republic of Indonesia Number 4586).
2. Law of the Republic of Indonesia Number 12 of 2012 concerning Higher Education (State Gazette of the Republic of Indonesia Year 2012 Number 158, Supplement to the State Gazette of the Republic of Indonesia Number 5336).
3. Government Regulation No. 4 of 2014 on the Organisation of Higher Education and the Management of Higher Education Institutions.
4. Presidential Regulation of the Republic of Indonesia No. 8 of 2012 on the Indonesian National Qualifications Framework (KKNI).
5. Regulation of the Minister of Education and Culture of the Republic of Indonesia No. 73 of 2013 on the Implementation of the KKNI in the Higher Education Sector.
6. Regulation of the Minister of Education and Culture No. 7 of 2020 concerning the Establishment, Amendment and Dissolution of State Higher Education Institutions, and the Establishment, Amendment and Revocation of Licences for Private Higher Education Institutions;
7. Regulation of the Minister of Education, Culture, Research, and Technology No. 13 of 2022 on Amendments to Regulation of the Minister of Education and Culture No. 22 of 2020 on the Strategic Plan of the Ministry of Education and Culture for the Years 2020–2024;



8. Regulation of the Minister of Education, Culture, Research and Technology No. 6 of 2022 concerning Diplomas, Competency Certificates, Professional Certificates, Degrees, and the Equivalence of Diplomas from Higher Education Institutions in Other Countries;
9. Regulation of the Minister of Education, Culture, Research, and Technology No. 53 of 2023 on Quality Assurance in Higher Education;
10. Regulation of the Minister of Higher Education, Science and Technology No. 39 of 2025 on Quality Assurance in Higher Education;
11. Decision of the Minister of Research, Technology, and Higher Education No. 123 of 2019 on Internships and the Recognition of Semester Credit Units for Industrial Internships for Bachelor's and Applied Bachelor's Degree Programmes.
12. Decision of *the Physical Society of Indonesia* (PSI) No. 0001/P.01/SK.08/2023 on Graduate Learning Outcomes and Minimum Content for the Physics Study Programme, the Physics Education Study Programme and the Physics Teaching Study Programme
13. Decision of the YINTERNSHIP PT PGRI Semarang No. 075/P.Y/U/Kpts/3.1/YINTERNSHIP PT PGRI/V/2019 dated 10 May 2019 regarding the Statutes of the UPGRIS;
14. Decision of the Rector of the UPGRIS, No. 056/SK/UPGRIS/IX/2024 regarding the Establishment of the Vision, Mission, and Objectives of the UPGRIS;
15. Rector's Decision of the UPGRIS, No. 013.a/SK/UPGRIS/II/2025 regarding Learning Outcomes for Graduates of Study Programmes at the UPGRIS;
16. Decision of the Rector of the UPGRIS, Number 012/SK/UPGRIS/II/2025 regarding the Establishment of the Structure and Distribution of Courses for Undergraduate Students at the UPGRIS;
17. Decision of the Rector of the UPGRIS, Number 014/SK/UPGRIS/II/2025 regarding the Determination of Course Credits for Master's Degree Students at the UPGRIS.
18. Decision of the Rector of the UPGRIS, Number 034.a/SK/UPGRIS/IV/2025 regarding the Determination of the Distribution of General Courses/Compulsory Curriculum Courses and Distinctive Courses of the UPGRIS
19. Rector's Decree on the Vision, Mission, Objectives, and Targets of the Faculty/Postgraduate Programme.
20. Rector's Decree on the Academic Vision of Study Programmes.



21. Regulation of the Rector of the UPGRIS, No. 132.C/SK/UPGRIS/IV/2014 regarding Guidelines for the Formulation of the Vision, Mission, Objectives, and Targets of the UPGRIS.
22. Rector's Decision of the UPGRIS, No. 439.A/SK/UPGRIS/IV/2014 regarding the establishment of the vision and mission of the UPGRIS.
23. Assignment Letter No. 75/SK/Faculty of Mathematics, Natural Sciences, And Information Technology Education/UPGRIS/11/2020 regarding the drafting team for the Vision and Mission of Faculty of Mathematics, Natural Sciences, And Information Technology Education.
24. Dean's Decision No. 120/3/Faculty of Mathematics, Natural Sciences, And Information Technology Education/UPGRIS/III/2015 regarding the Approval of the Vision and Mission of Faculty of Mathematics, Natural Sciences, And Information Technology Education.
25. Assignment Letter No. 85.B/3.1/Faculty of Mathematics, Natural Sciences, And Information Technology Education/UPGRIS/VIII/2022 regarding the drafting team for the Academic Vision, Objectives and Strategies for achieving the academic vision of the Physics Education Study Programme.
26. Dean's Decree No. 17/3.3/SK/Faculty of Mathematics, Natural Sciences, And Information Technology Education/UPGRIS/IX/2022 regarding the Approval of the Academic Vision, Objectives and Strategies for achieving the academic vision of the Physics Education Study Programme.



2. Curriculum Evaluation & *Tracer Study*

2.1 Curriculum Evaluation

The Physics Education Study Programme was formally granted Registered status through the Decree of the Directorate General of Higher Education, Department of Education and Culture of the Republic of Indonesia, Number 142/DIKTI/Kep/1993, dated 20 April 1993, concerning the granting of Registered status to undergraduate departments and study programmes within the Faculty of Mathematics and Natural Sciences Education of IKIP PGRI Semarang. Since its establishment, the programme has undergone several stages of accreditation, as follows:

- Accredited Status B was obtained via a Decision from the National Accreditation Board for Higher Education (BAN-PT) No. 026/BAN-PT/Ak-IX/S1/I/2006
- Accredited Status C was obtained by Decree of the National Accreditation Board for Higher Education (BAN-PT) Number 028/BAN-PT/Ak-XII/SI/XI/2011
- Accredited Status B was obtained through a Decision from the National Accreditation Board for Higher Education (BAN-PT) No. 062/AK/UPGRIS/X/2015
- Accredited B status was obtained by Decision of the National Accreditation Board for Higher Education (BAN-PT) No. 5335/SK/BAN-PT/Ak-PPJ/S/IX/2020
- Excellent Accreditation Status was granted by a Decision from the Independent Education Accreditation Agency (LAMDIK) No. 1727/SK/LAMDIK/Ak/S/X/2024

This accreditation demonstrates national recognition of the quality of various aspects of the delivery of educational programmes within the study programme. Internally, the Physics Education Study Programme follows an academic quality assurance cycle through Internal Quality Audit (AMI) activities organised by the UPGRIS, on a regular annual basis.



In 2024, a major (biennial) evaluation of the Physics Education Study Programme curriculum was carried out to align with the government’s **Merdeka Belajar - Kampus Merdeka (MBKM)** policy, as outlined in Ministry of Education, Culture, Research and Technology Regulation No. 53 of 2023 on Higher Education Quality Standards, which was subsequently renamed to ‘**Fulfilment of Learning Load Outside the Study Programme**’ in accordance with Ministry of Education, Culture, Research and Technology Regulation No. 39 of 2025 on Higher Education Quality Standards, as well as advancements in science and technology and the needs of the education sector. The evaluation includes a review of the vision and mission, the independent professional profile (PPM), graduate learning outcomes (PLO), *updates to study materials*, and the establishment of the curriculum structure.

Fundamental changes to the 2024 Physics Education Study Programme Curriculum Evaluations of the implementation of the **Physics Education Study Programme** curriculum are conducted periodically to ensure alignment with the institution’s vision, the needs of students, and developments in science and technology. These evaluations comprise two types: **formative** and **summative evaluations**, involving various stakeholders such as lecturers, students, alumni, graduate employers, and partner organisations.

Table 2.1. Evaluation of the 2022 Curriculum and Follow-up Actions for the 2025 Curriculum

| Evaluation Components | Review | Action Plan |
|--|---------------------------------|---|
| Academic Vision – Educational Objectives – and Strategies for Achieving Educational Objectives | | |
| a. Relevance of the Academic Vision, Educational Objectives, and Strategies for Achieving Educational Objectives to the Faculty’s VMTS | In line with the Faculty’s VMTS | Maintaining the relevance of achievement |
| b. Relevance of the Academic Vision, Educational Objectives, and Strategies for Achieving Educational Objectives to learning outcomes | Already in line | Maintaining the achievement of relevance |
| c. Relevance of the Academic Vision, Educational Objectives, and Strategies for Achieving Educational Objectives to the graduate profile | Too many profiles | Reducing the number of profiles to ensure greater focus |
| d. Relevance of the curriculum to the KKNI (appropriate to the level) | Appropriate | Maintain alignment |
| e. Curriculum relevance to Ministry of Education, Culture, Research and Technology Regulation No. 53 of 2023 | Compliant | Maintaining alignment |
| f. Relevance of the curriculum to the world of work | Relevant | Staying relevant |



| Evaluation Components | Review | Action Plan |
|---|---|---|
| g. Scope of competencies/skills (academic fields of the study programme and the needs/demands of the workplace) | English language skills need to be improved | Add English language modules for physics |
| h. Clarity of competency/skill content | Clear | Reapply |
| Programme Graduate Profile | | |
| Alignment of the Graduate Profile with the world of work | There are 6 graduate profiles | The graduate profiles are focused into 3 |
| Programme Learning Outcomes | | |
| a. Scope of Competencies | Adequate | Aligning with the new graduate profiles |
| b. Clarity of references for formulating learning outcomes | Referring to the PSI association | Refers to the latest PSI association |
| c. Coherence of the formulation of learning outcomes | Already coherent | Maintaining coherence |
| d. Quality of formulation (specific, measurable, and observable) | Already specific, measurable and observable | Maintain |
| e. Relevance of learning outcomes to graduate profile | Already aligned | Maintain |
| Curriculum structure | | |
| a. Overall coverage of courses at one level (learning outcomes, profile, and courses) | Adequate | Maintaining |
| b. Interconnection between levels (Bachelor's and Master's, where applicable) | - | - |
| c. Organisation of courses (University-level courses, faculty-level courses, programme-specific courses (compulsory and optional)) | Already organised | Maintained |
| d. Relevance of the course structure to the policy on fulfilling study load requirements outside the degree programme (for Bachelor's degree) | relevant | Maintain |
| Course Description | | |
| a. Depth of learning material | Adequate | maintain |
| b. Scope of learning material | Adequate | Maintain |
| c. Relevance of CLO to PLO | Relevant | Maintain |
| d. Course format (lectures/theory, seminars, practicals, fieldwork, etc.) | Insufficient number of practical sessions | Increase the number of practical sessions |
| Course distribution | | |
| a. Academic sequence of courses | Appropriate | Maintain |
| b. Proportion of compulsory courses, elective courses, and general education courses | Proportional | maintaining |
| c. The total credit load per semester | Proportional | maintain |
| Human Resources (HR) | | |
| a. Academic relevance | Relevance | maintaining |
| b. Experience and Expertise | Suitable | maintaining |
| c. Qualifications and adequacy of educational staff based on their job type | Adequate | maintaining |



| Evaluation Components | Review | Action Plan |
|--|----------------------------|------------------|
| (administration, librarians, technicians, laboratory assistants, etc.) | | |
| Facilities and Infrastructure | | |
| a. Laboratories (workshops/studios/fields/etc.) | Adequate | maintain |
| b. Laboratory equipment and materials (workshop/garage/studio/field/etc.) | Adequate | maintain |
| c. Library | Adequate | maintain |
| d. Classrooms | Adequate | maintain |
| Curriculum flexibility | | |
| Teaching Materials | | |
| a. Termly Lesson Plans | Not yet 100% | Complete to 100% |
| b. Teaching Materials | Adequate | maintain |
| c. Media (ICT) | Adequate | maintaining |
| d. Device support for PLO achievement efforts | Adequate | maintain |
| Learning Process | | |
| a. Transformation of teaching and learning experiences | Adequate | maintaining |
| b. Use of <i>case-based</i> learning methods or <i>team-based project</i> learning with an assessment weighting of more than 50% | Not all courses | All courses |
| c. Alignment of the learning process with the Course Syllabus | Compliant | Maintained |
| d. Compliance in implementing learning through SPADA at the UPGRIS | Not yet 100% | Aiming for 100% |
| e. The learning process is collaborative, involving interaction between individual learners | Already implemented | Maintaining |
| f. Implementation of character values (<i>university values</i>) in and outside the classroom | Has been implemented | maintaining |
| g. Lecturer attendance | 16 times | 16 times |
| h. student attendance | Meeting | Maintained |
| Learning assessment | | |
| a. Assessment planning contract | In accordance with | maintain |
| b. Assessment procedures | In accordance | maintain |
| c. Scope of assessment (attitudes, knowledge, general and specific skills) | Already covers all aspects | Maintain |
| d. Appropriateness of assessment techniques in relation to assessment aspects | Appropriate | Maintain |
| e. Verification of assessment instruments | Verified | Maintain |
| f. Processing of marks in accordance with applicable regulations | In accordance | maintaining |
| g. follow-up on assessment results (grading, enrichment, remedial work) | Compliant | Maintain |
| Graduates | | |
| a. Cumulative Grade Point Average (CGPA) | 3.56 | |



| Evaluation Components | Review | Action Plan |
|--|--|-------------|
| b. Duration of Study | 3.97 years | |
| c. Graduate employment rate | 91% | |
| d. Graduate waiting period | 1.79 months | |
| e. Relevance of employment to field of expertise | 95.3% | |
| f. Starting salary | Rp 2,505,319 | |
| g. Graduate Distribution | In total, 49 people (91%) are in employment, 4 people (7%) are continuing their studies, and 1 person (2%) is not yet able to work | |
| h. User Satisfaction | The majority of graduate users rate the alumni's abilities as very good (83.27%) or good (16.73%) | |
| i. Academic achievements | International academic achievements are still lacking. | |
| j. Professional Certification | Management of Multimedia Learning Materials | |

Table 2.2 Results of External Evaluation (with industry partners)

| Curriculum Input | Action Plan |
|---|---|
| 1. Materials related to automation and sensor instrumentation have been added. | Evaluation of the syllabuses for the courses: Basic Electronics, Advanced Electronics, Interfacing 1, Interfacing 2, and Interfacing 3. |
| 2. Added Applied Physics courses (Materials Physics, etc.) | Offering elective modules that support other graduate profiles, namely Advanced Computer Programming 1, 2, 3, and Advanced Materials Physics. |
| 3. Added material on image processing, AI, digital systems, content creation, application project development, and IoT. | <ul style="list-style-type: none"> • Evaluation of the syllabuses for the courses in Computational Physics, Basic Electronics, Advanced Electronics, Interfacing 1, Interfacing 2, Interfacing 3, and Advanced Computer Programming 1, 2, and 3. • Organising related lectures outside the programme, for example on intelligent systems with the Computer Science programme. |
| 4. Enhancing the application of theory to everyday life. | <ul style="list-style-type: none"> • Evaluation of the syllabus for practical modules. • The number of sessions in practical courses has been increased from the original 6 to 8. |

2.2 Tracer Study

Furthermore, the tracer study yielded the following information:

1. Employment status
2. Average Monthly Income



3. Place of Work
4. Field of Work
5. Length of Service
6. Job Title
7. Relationship between field of study and job
8. Feedback on the Curriculum
9. Feedback on Programme Development
10. Follow-up on the Study Programme

Table 2.3. Curriculum feedback from alumni and Curriculum Follow-up Plan

| Curriculum Input | Follow-up Plan |
|--|--|
| Basic physics material needs to be explored in greater depth | Review the syllabuses for basic physics and secondary school physics courses to ensure the material is covered in greater depth and is relevant to the needs of lower and upper secondary school levels. |
| Increase practical experience, such as work placements | Establish partnerships with universities as internship providers. |
| Strengthen <i>life skills</i> , emotional management, <i>multitasking</i> , <i>public speaking</i> , marketing, entrepreneurship, information technology, and interactive media. | <ul style="list-style-type: none"> • Coordinate with faculty leadership to provide <i>life skills</i> training at the faculty level. • Review the syllabus for the entrepreneurship module to enhance entrepreneurial and marketing skills. • Integrate emotional management and <i>public speaking</i> skills into specific courses. • Integrate interactive learning media into lectures to familiarise students with modern technology. |
| Pedagogical materials must be more in-depth and practical. | Evaluate lesson plans and assessment tools for pedagogy modules. |
| Balance theory and practice to ensure students are work-ready | <ul style="list-style-type: none"> • Implement project-based learning (<i>PBL</i>). • Provide an internship programme. |
| Learning materials that are constantly updated to meet the needs of the modern era | The curriculum in the Physics Education programme already includes a module on physics teaching materials and media. This module has been <i>updated</i> with content that reflects current needs |
| A course on entrepreneurship has been added | The curriculum in the Physics Education programme already includes an entrepreneurship course. This course will be adapted to meet the needs of the modern era and its name will be changed to technology-based entrepreneurship |
| Courses such as learning evaluation, or other teaching courses, should be reinforced through practical sessions on creating assessment tools, and these should be conducted repeatedly as they are highly beneficial in the teaching profession. | The curriculum in the Physics Education programme for teaching courses will include practical sessions on instrument making |



| Curriculum Input | Follow-up Plan |
|---|--|
| Input: Work experience (internships) should be incorporated | In the future, the curriculum for the Physics Education programme will include an industrial placement in the 7th semester (in line with <i>the Centre of Excellence</i> of the Physics Education programme, namely the management of multimedia learning resources, as well as prototype electronics and programming) and an educational placement, each lasting 3 months. |
| Suggestion: Add a course on <i>Scientific Communication</i> | The curriculum in the Physics Education programme already includes courses related to <i>scientific communication</i> , such as scientific publications in education and final project proposal seminars. Follow-up will involve further exploration of the subject matter |
| The curriculum implemented in the programme is already good. However, it would be even better if the core material for the school level were expanded and explored in greater depth. | The curriculum in the Physics Education programme already includes courses related to foundational material for school level, namely in the courses ‘Secondary School Physics for Year 10’ and ‘Secondary School Physics for Year 11’. Follow-up will involve further exploration of the subject matter. |
| Students should be better prepared for employment, whether in fields aligned with or outside their degree programme, and their <i>skills</i> should be enhanced so that upon graduation they are ready for the workforce. | In the future, the curriculum in the Physics Education programme will include an industrial placement in Semester 7 (in line with <i>the Centre of Excellence</i> of the Physics Education programme, namely multimedia learning materials management, prototype electronics and programming) and an educational placement, each lasting 3 months. |
| Interactive learning media, such as the use of technology, are utilised to support contemporary learning. | The curriculum in the Physics Education programme already includes topics related to interactive learning media, covered in the course ‘Physics Media and Teaching Materials’. Further development will involve deepening the study of these materials, and subsequently, the seventh-semester curriculum will include an industrial placement (in line with <i>the Centre of Excellence</i> of the Physics Education programme, namely the management of multimedia learning media). Students who do not undertake the industrial placement will take the following courses: 1. Research and Project Design (3 credits), 2. Visual and Narrative Development (3 credits), 3. Multimedia Asset Design and Production (2 credits), 4. Audio-Visual Integration in Multimedia (2 credits). |
| Digital-based curriculum, Physics & Information Technology | The curriculum of the Physics Education programme is now digital-based, focusing on physics and information technology. A curriculum that is even more digital-based, focusing on physics and information technology, will subsequently be developed, |
| Selected Topics and Practical Work | The curriculum for the Physics Education programme now includes courses related to selected topics and practical work, namely the ‘Secondary School Physics’ course for Year 10 and the ‘Secondary School Physics’ course for Year 11. Further improvements will be made regarding |



| | |
|-------------------------|-------------------------------------|
| Curriculum Input | Follow-up Plan |
| | selected topics and practical work. |

Table 2.4. Programme Input from Alumni and Programme Action Plan

| Programme Input | Action Plan |
|---|--|
| Align the curriculum with the world of work. | <ul style="list-style-type: none"> • Conduct periodic tracer studies to understand the skills and competencies required in the workplace. • Revitalise the curriculum based on the needs of the workplace. |
| Please clarify the role of academic tutors. | Communicate and remind academic tutors of their roles at every programme meeting |
| Please clarify the conversion of courses for off-campus learning (BPLK) | The conversion of PBLK courses is already included in the curriculum; please communicate this to students |
| Extracurricular and co-curricular activities | Mapping of students' talents and interests with student clubs at the UPGRIS |

2.3 SWOT analysis

Table 2.5 SWOT Matrix

| SWOT Elements | | Internal | |
|-----------------|-----------------------------|---|--|
| | | <i>Strengths / Potential</i> | <i>Constraints / Weaknesses</i> |
| External | <i>Opportunities</i> | SO Strategy | WO Strategy |
| | | a) Enhancing understanding and internalisation of VMTS achievements by the academic community and all <i>stakeholders</i> . b) Optimising the public leadership of lecturers as representatives of public duties in support of the Faculty's vision and mission. c) Increasing the number of students participating in competitions, both at national and international levels d) Utilising the alumni network to accelerate graduates' employment | a. Strengthening synergies in the implementation of the VMTS at the UPGRIS, within an integrated work programme. Strengthening international networks to support the strategic performance of study programmes (IKS), particularly international IKS. b. Involving students in all lecturers' research activities c. Recruiting students to participate in the PKM d. Publishing students' final projects in seminars or journals e. Improving English language skills through English bridging programmes |
| | Challenges / Threats | ST Strategy | WT Strategy |
| | | 1. Strengthening understanding of VMTS implemented in academic and non-academic activities of the academic community, as well as all | a. Development of outreach methods and VMTS tracer studies for the entire academic community and all |



| | | | |
|--|--|---|---|
| | | <p>programme <i>stakeholders</i></p> <ol style="list-style-type: none"> 2. Expansion of networks and implementation of cooperation at both national and international levels to accelerate the realisation of the Faculty's excellence. 3. Establishment of <i>external advisory bodies</i> at both national and international levels 4. Increased use of online media to enhance understanding of lectures 5. Involvement of the industry in the curriculum or learning processes, research and community service 6. Improving the quality of laboratory facilities to meet current technological needs 7. Continuous improvement of learning materials to ensure they align with industry needs 8. Consider involving civil engineering experts from leading ASEAN universities to evaluate all aspects of the study programme | <p>stakeholders.</p> <ol style="list-style-type: none"> b. Utilising the alumni network to assist <i>recent graduates</i> in securing employment, finding work placement locations, internships, and final project topics. c. Enhancing English language proficiency for lecturers d. <i>Workshops</i> (<i>cyber pedagogy</i>) or enhancing lecturers' skills in teaching via online systems in line with Education 4.0 teaching and learning. |
|--|--|---|---|

3. Vision, Mission and Educational Objectives

3.1 University Vision, Mission and Objectives

a. University Vision

To become an excellent with integrity university

b. University Mission

1. To provide education that produces outstanding and self-reliant scholars;
2. To conduct research as the foundation for the advancement of knowledge and the enhancement of the quality of learning;
3. To carry out community service for the betterment of life and living; and
4. To set an example in the delivery of education, research and community service.

c. Objectives of the University

1. The realisation of outstanding and self-reliant intellectuals;
2. To achieve academic and learning quality based on research;
3. The realisation of community service that benefits life and living; and
4. The implementation of exemplary leadership in the delivery of education, research and community service.



3.2 Vision, Mission and Objectives of the Faculty

a. Vision

To become an excellence Faculty of Mathematics, Natural Sciences and Information Technology with integrity.

b. Mission

1. To provide education and mentoring to produce graduates in the fields of Mathematics, Natural Sciences, and Information Technology Education who are outstanding and possess a strong sense of identity
2. To conduct innovative research to enhance the quality of learning in the fields of Mathematics, Natural Sciences, and Information Technology Education
3. To carry out community service as an implementation of research outcomes to improve the quality of life and well-being of the community
4. To engage in partnership activities with domestic and international institutions as a manifestation of the Tridharma of Higher Education

c. Objectives

1. To produce outstanding and distinctive graduates of the Bachelor’s Programme in Mathematics, Science, and Information Technology Education
2. To produce research outputs as a basis for improving the quality of learning, advancing knowledge, and enhancing professionalism in the fields of Mathematics, Science, and Information Technology Education
3. To produce high-quality community service work as an implementation of research outcomes to improve community welfare
4. To establish partnership networks with domestic and international institutions as a manifestation of the Tridharma of Higher Education

3.3 Academic Vision and Educational Objectives of the Study Programme

a. Academic Vision of the Study Programme

“To develop the academic discipline of physics education to produce graduates who excel in technology and possess a strong sense of identity”

b. Educational Objectives of the Programme

Table 3.1. Programme Educational Objectives (PPEO)

| No | Programme Educational Objective Code | Description of Programme Educational Objectives |
|----|--------------------------------------|--|
| 1 | PEO-1 | Graduates are able to apply basic educational concepts |

| No | Programme Educational Objective Code | Description of Programme Educational Objectives |
|----|--------------------------------------|--|
| | | and learning theories in designing, implementing and evaluating innovative physics learning by utilising science and technology responsibly, as well as possessing character and AdAb values |
| 2 | PEO-2 | Graduates excel in developing technology-based multimedia learning resources in the fields of physics education and entrepreneurship |
| 3 | PEO-3 | Graduates excel in developing prototype electronics and programming |

c. Strategies for Achieving the Programme's Educational Objectives

Table 3.2 Strategies for Achieving the Programme's Educational Objectives

| PEO Code | PEO Formulation | Achievement Strategy |
|----------|---|---|
| PEO1 | Graduates are able to apply basic educational concepts and learning theories in designing, implementing, and evaluating innovative physics learning by utilising science and technology responsibly, as well as possessing character and AdAb values. | <ul style="list-style-type: none"> - Integration of educational theory and innovative teaching practices into the curriculum. - Implementation of science and technology-based microteaching and teaching practice at partner schools. - Instilling character values and AdAb in all academic and student activities. |
| PEO2 | Graduates excel in developing technology-based multimedia learning resources in the fields of physics education and entrepreneurship. | <ul style="list-style-type: none"> - Delivery of courses and projects on the development of digital learning media. - Training in graphic design, animation, educational videos, and interactive applications. - Strengthening entrepreneurship through a teaching media studio and educational innovation competitions. |
| PEO3 | Graduates excel in developing electronic prototypes and programming. | <ul style="list-style-type: none"> - Implementation of project-based learning in electronics and programming courses. - Enhancement of IoT and microcontroller laboratory facilities. - Lecturer-student research collaboration in the development of technology-based tools and systems. |



4. Graduate Profile, Programme Educational Objectives (PEO) & Programme Learning Outcomes (PLO/PLO)

4.1 Graduate Profile and Programme Educational Objectives

Table 4.1. Graduate Profile and Description

| No | Graduate Profile (GP) | Description of Graduate Profile |
|----|---|--|
| 1 | Innovative Physics Educator | A physics educator capable of applying fundamental educational concepts and learning theories in designing, implementing and evaluating innovative physics teaching by utilising science and technology responsibly, whilst possessing character and ethical values. Profile 1: Physics teacher at lower secondary/upper secondary/vocational schools Profile 2: Education Instructor Profile 3: Science Teacher Profile 4: MGMP facilitator |
| 2 | Developer of Physics Learning Materials and Teaching Aids | Developer of learning media and physics teaching aids capable of developing technology-based multimedia learning media in the fields of physics education and entrepreneurship. Profile 1: Interactive media developer Profile 2: Content Creator Profile 3: Educational Technopreneur Profile 4: Demonstration equipment maker |
| 3 | Prototype electronics and programming specialist | Professional capable of developing prototype electronics and programming Profile 1: Specialist in prototype electronics and software programming |

Table 4.2 Table of Correlation between Graduate Profiles and Programme Educational Objectives

| No | Graduate Profile (GP) | Programme Educational Objectives (PPEO) | | |
|----|-----------------------|---|-------|-------|
| | | EEO-1 | EPO-2 | EPO-3 |
| 1 | GP-1 | √ | | |
| 2 | GP-2 | | √ | |
| 3 | GP-3 | | | √ |



4.2 Formulation of PLO

Table 4.3 Learning Outcomes for Graduates of the Study Programme

| Code | Description of Graduate Learning Outcomes (PLO) |
|--------|---|
| PLO-1 | Demonstrates character and conduct that reflect adaptability, enthusiasm and integrity as a manifestation of devotion to God Almighty |
| PLO-2 | Understands educational theory and learner development, research methodology in physics education, as well as the principles, methods, and techniques of contextual physics learning utilising ICT. |
| PLO-3 | Mastering theoretical concepts of classical and modern physics, principles and applications of mathematics, computation, and physics instrumentation, as well as operational knowledge of instruments and software used in the field of physics and its teaching. |
| PLO-4 | Being able to design, implement, manage, and evaluate secondary school physics learning independently and innovatively using a scientific approach, based on <i>pedagogical content knowledge</i> and instructional design principles, as well as effectively utilising science and technology and learning resources (including laboratories) to develop students' scientific thinking skills. |
| PLO-5 | Able to apply concepts of classical and modern physics, mathematics, and instrumentation and software technology to analyse and solve physics problems accurately and systematically. |
| PLO-6 | Able to conduct research and scientific studies in the field of physics education as an alternative problem-solving approach to produce published scientific papers |
| PLO-7 | Able to make appropriate decisions based on the analysis of information and data in the field of physics education, and able to provide guidance in selecting various alternative solutions, both independently and in groups. |
| PLO-8 | Take responsibility in the field of physics education and be entrusted with responsibility for the achievement of group work outcomes. |
| PLO-9 | Able to creatively and contextually develop innovative technology-based multimedia learning resources, and manage educational products as a form of entrepreneurship in the field of education. |
| PLO-10 | Able to independently develop prototype electronics-based systems or products and software. |
| PLO-11 | Evaluate and integrate concepts of religion, nationality, the constitution, language, and technology-based entrepreneurship with the 5A values (anti-violence, anti-drugs, anti-bullying, anti-intolerance, and anti-corruption) to support the development of professional knowledge and practice |

| KKNI Level for Bachelor 's Degree Program mes | PLO Description | | | | | | | | | | |
|---|-----------------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|
| | PLO-1 | PLO-2 | PLO-3 | PLO-4 | PLO-5 | PLO-6 | PLO-7 | PLO-8 | PLO-9 | PLO-10 | PLO-11 |
| S-a | √ | | | | | | | | | | |
| S-b | √ | | | | | | | | | | |
| S-c | √ | | | | | | | | | | |
| S-d | √ | | | | | | | | | | |
| S-e | √ | | | | | | | | | | |
| S-f | √ | | | | | | | | | | |
| PP | | √ | √ | | | | | | | | √ |
| KK | | | | √ | √ | √ | | | √ | √ | |
| KTJ-1 | | | | | | √ | | | | | |
| KTJ-2 | | | | | | | √ | | | | |

4.3 Matrix of the relationship between PLO and Graduate Profile

Table 4.4. Matrix of the Relationship between Programme Profile and PLO

| Code | Programme Learning Outcomes | GP1 | GP2 | GP3 |
|-------|---|-----|-----|-----|
| PLO-1 | Demonstrates character and conduct that reflect adaptability, enthusiasm and integrity as an expression of devotion to God Almighty | √ | √ | √ |
| PLO-2 | Understanding educational theory and learner development, research methodology in physics education, as well as the principles, methods, and techniques of contextual physics learning utilising ICT. | √ | √ | |
| PLO-3 | Mastering theoretical concepts of classical and modern physics, principles and applications of mathematics, computation, and physics instrumentation, as well as operational knowledge of instruments and software used in the field of physics and its teaching. | √ | √ | √ |
| PLO-4 | Able to design, implement, manage, and evaluate secondary school physics teaching independently and innovatively using a scientific approach, based on <i>pedagogical content knowledge</i> and instructional design principles, as well as effectively utilising | √ | | |



| Code | Programme Learning Outcomes | GP1 | GP2 | GP3 |
|---------------|--|-----|-----|-----|
| | science, technology, engineering and mathematics (STEM) and learning resources (including laboratories) to develop students' scientific thinking skills. | | | |
| PLO-5 | Able to apply concepts of classical and modern physics, mathematics, and instrumentation and software technology to analyse and solve physics problems accurately and systematically. | √ | √ | √ |
| PLO-6 | Able to conduct research and scientific studies in the field of physics education as an alternative problem-solving approach to produce published scientific papers | √ | √ | √ |
| PLO-7 | Able to make appropriate decisions based on the analysis of information and data in the field of physics education, and able to provide guidance in selecting various alternative solutions, both independently and in groups. | √ | √ | √ |
| PLO-8 | Take responsibility for the field of physics education and be entrusted with responsibility for the achievement of group work outcomes. | √ | √ | √ |
| PLO-9 | Able to creatively and contextually develop innovative technology-based multimedia learning resources, and manage educational products as a manifestation of entrepreneurship in the field of education. | | √ | |
| PLO-10 | Able to independently <i>develop</i> prototype electronics-based systems or products and <i>software</i> . | √ | | √ |
| PLO-11 | Evaluate and integrate concepts of religion, nationalism, the constitution, language, and technology-based entrepreneurship with the 5A values (anti-violence, anti-drugs, anti-bullying, anti-intolerance, and anti-corruption) to support the development of professional knowledge and practice | √ | √ | √ |

4.4 Matrix of the relationship between the Programme's PLOs and the Programme's Educational Objectives

Table 4.5. Matrix of the relationship between the Programme's PLOs and the Programme's Educational Objectives

| Code | Programme PLO Description | PEO-1 | PEO-2 | PEO-3 |
|--------------|--|-------|-------|-------|
| PLO-1 | Demonstrating character and conduct that reflect adaptability, enthusiasm and integrity as an expression | √ | √ | √ |



| Code | Programme PLO Description | PEO-1 | PEO-2 | PEO-3 |
|---------------|--|-------|-------|-------|
| | of devotion to God Almighty | | | |
| PLO-2 | Understanding educational theory and learner development, research methodology in physics education, as well as the principles, methods, and techniques of contextual physics learning utilising ICT. | √ | √ | |
| PLO-3 | Mastering theoretical concepts of classical and modern physics, principles and applications of mathematics, computation, and physics instrumentation, as well as operational knowledge of instruments and software used in the field of physics and its teaching. | √ | √ | √ |
| PLO-4 | Able to design, implement, manage, and evaluate secondary school physics teaching independently and innovatively using a scientific approach, based on <i>pedagogical content knowledge</i> and instructional design principles, as well as effectively utilising science, technology, engineering and mathematics (STEM) and learning resources (including laboratories) to develop students' scientific thinking skills. | √ | | |
| PLO-5 | Able to apply concepts of classical and modern physics, mathematics, and instrumentation and software technology to analyse and solve physics problems accurately and systematically. | √ | √ | √ |
| PLO-6 | Capable of conducting research and scientific studies in the field of physics education as an alternative approach to problem-solving, resulting in published scientific papers | √ | √ | √ |
| PLO-7 | Able to make appropriate decisions based on the analysis of information and data in the field of physics education, and able to provide guidance in selecting various alternative solutions, both independently and in groups. | √ | √ | √ |
| PLO-8 | Take responsibility for the field of physics education and be entrusted with responsibility for the achievement of group work outcomes. | √ | √ | √ |
| PLO-9 | Able to creatively and contextually develop innovative technology-based multimedia learning resources, and manage educational products as a manifestation of entrepreneurship in the field of education. | | √ | |
| PLO-10 | Able to independently develop prototype electronics-based systems or products and software. | | | √ |
| PLO-11 | Evaluate and integrate concepts of religion, nationalism, the constitution, language, and technology-based entrepreneurship with the 5A values (anti-violence, anti-drugs, anti-bullying, anti-intolerance, and anti-corruption) to support the development of professional knowledge and practice | √ | √ | √ |



5. Determination of Study Materials

5.1 Body of Knowledge (BoK)

Table 5.1. Level of Depth and Mastery of Learning Materials

| No | Programme Graduates | Minimum Level of Depth & Breadth of Material |
|----|---------------------|--|
| 1. | Bachelor's | Minimum: 1. master the theoretical concepts of a specific field of knowledge and skills, both generally and specifically, to solve problems procedurally in accordance with the scope of their work; and 2. be able to adapt to changing situations faced by the Programme. |
| 2. | Professional | Minimum: 1. Mastering the applied theory of a specific field of knowledge and skills by utilising science and technology within a specific professional field; and 2. able to manage resources, apply professional standards, evaluate, and develop organisational strategies. |
| 3. | Master's | At a minimum, mastery of the theory of a specific field of knowledge to advance science and technology through research or the creation of innovative works. |

Study Materials

The study materials are formulated based on PLO descriptors as shown in Table 5.2.

Table 5.2. Study materials based on the PLO of the study programme

| PLO | Description of Programme PLO | Study Materials |
|-------|---|---|
| PLO-1 | Able to demonstrate character and manners that reflect adaptability, enthusiasm and integrity as a manifestation of piety towards God Almighty. | BK 1.1 Islam BK 1.2 Christianity BK 1.3 Catholicism BK 1.4 Buddhism BK 1.5 Hinduism BK 1.6 Confucianism BK 1.7 Pancasila Education BK 1.8 Civics Education BK 1.9 1. The nature of Indonesian as the language of unity and the national language; 2. Exploring texts in academic life (instilling values and the nature of the Indonesian language as a vehicle for knowledge); 3. Exploring the world of libraries; 4. Designing research proposals and activity proposals; 5. Reporting research findings and activity outcomes; and 6. Expressing oneself in academic articles. BK 1.10 PGRI Studies BK 1.11 1. <i>Simple Present Tense</i> |



| PLO | Description of Programme PLO | Study Materials |
|-------|--|---|
| | | <p>2. <i>Present Continuous Tense</i> 3. <i>Simple Past Tense</i> 4. <i>Present Perfect Tense</i> 5. <i>Simple Future Tense</i> BK 1.12 1. <i>Design thinking</i> 2. <i>Business Model Canvas</i> 3. <i>Prototyping</i> BK 1.13 1. <i>Marketing Plan and Channels</i> 2. <i>Planning and Strategising</i> 3. <i>Unit Product Cost & Pricing Method</i> 4. <i>Business Planning & Feasibility Study</i> 5. <i>Intention to become an entrepreneur</i> 6. <i>Communication & Negotiation Skills</i> BK 1.14 Community Empowerment BK 1.15 1. Mastery of educational disciplines 2. Knowledge of the academic discipline of the study programme 3. Understanding of learners BK 1.16 Teaching BK 1.17 1. Teaching 2. Knowledge of the field of physics BK 1.18 1. Learners' understanding 2. Learning 3. Mastery of educational science 4. Knowledge of the academic discipline of the study programme BK 1.19 Academic ethics in scientific publications BK 1.20 Professional Ethics for Teachers</p> |
| PLO-2 | Understanding educational theory and learner development, research methodology in physics education, physics laboratory management, as well as the principles, methods, and techniques of contextual physics learning utilising ICT. | <p>BK 2.1 Foundations of Education BK 2.2 Student Development BK 2.3 Theories of learning and physics instruction BK 2.4 <i>Revised Bloom's Taxonomy</i> BK 2.5 Philosophy of Physics BK 2.6 21st-Century Skills BK 2.7 Basic teaching skills BK 2.8 Physics Instructional Design BK 2.9 <i>English for Physics Instruction</i> BK 2.10 <i>Academic Writing for Physics Education Research</i> BK 2.11 Development of teaching materials and learning media BK 2.12 Video, Animation and Graphic Design BK 2.13 Physics Curriculum for Year 10 in Secondary Schools</p> |



| PLO | Description of Programme PLO | Study Materials |
|-------|--|---|
| | | BK 2.14 Physics curriculum in Year 11 secondary schools BK 2.15 <i>Assessment as, for and of learning</i> BK 2.16 Aspects of assessment BK 2.17 Computer-assisted assessment of literacy, numeracy and higher-order thinking skills BK 2.18 Item analysis BK 2.19 The nature of research BK 2.20 Problem identification BK 2.21 Research methods in physics education BK 2.22 The function of the classroom as a physics laboratory BK 2.23 Laboratory management BK 2.24 Health and Safety in the Physics Laboratory BK 2.25 Principles of Scientific Writing BK 2.26 Principles of scientific writing BK 2.27 Basic concepts of microteaching BK 2.28 Teachers' pedagogical competencies BK-2.29 Probability BK 9.1 Creative multimedia research BK 9.2 Multimedia project proposal BK 9.3 Visual direction (<i>storyline</i>) BK 9.4 Visual assets (graphic design, animation, graphic video) BK 9.5 Integration of all multimedia components related to audio and visuals BK 1.15 Mastery of educational disciplines BK 1.16 Teaching BK 1.17 Teaching BK 1.18 Teaching BK 6.2 Conducting research in physics education BK 6.3 Writing up research findings |
| PLO-3 | Mastery of theoretical concepts in classical and modern physics, principles and applications of mathematics, computation, and physics instrumentation, as well as operational knowledge of instruments and software used in the field of physics and its teaching. | BK-3.1 Functions BK-3.2 Limits BK-3.3 Derivatives BK-3.4 Integrals BK-3.5 Matrix operations BK-3.6 Complex numbers BK-3.7 Series BK-3.8 Complex Algebra and Functions BK-3.9 Ordinary Differential Equations BK-3.10 Partial differential equations BK-3.11 Integral transforms BK-3.12 Systems of linear equations BK-3.13 Variational calculus BK-3.14 Computer programming BK-3.15 Introduction to Numerical Methods BK-3.16 DC Circuits BK-3.17 Thevenin's and Norton's Theorems |



| PLO | Description of Programme PLO | Study Materials |
|-----|------------------------------|---|
| | | BK-3.18 AC Circuits BK-3.19 Semiconductors BK-3.20 Testing the performance of analogue electronics BK-3.21 Electrical Measurement Instruments BK-3.22 Logic Gates BK-3.23 Sensors BK-3.24 Digital electronics performance testing BK-3.25 Simple signal processing BK-3.26 Output devices BK-3.27 Digital data transmission BK-3.28 Newton's concept of space-time BK-3.29 Fundamental quantities of motion BK-3.30 Types of motion BK-3.31 Analysis of particle motion BK-3.32 Newton's Laws BK-3.33 Applications of Newton's Laws BK-3.34 Work and energy BK-3.35 Gravity BK-3.36 Fluid Concepts BK-3.37 Ideal Fluids BK-3.38 Viscous Fluids BK-3.39 Temperature and heat BK-3.40 Transport Phenomena BK-3.41 Thermodynamic Systems BK-3.42 The zeroth law of thermodynamics BK-3.43 Ideal gases BK-3.44 The First Law of Thermodynamics BK-3.45 The second law of thermodynamics: entropy, the principle of maximum entropy, the Carnot process BK-3.46 Entropy BK-3.47 Motion of a many-particle system BK-3.48 Motion of rigid bodies BK-3.49 Non-inertial reference frames BK-3.50 Lagrange and Hamilton formulations BK-3.51 Motion in a central force field BK-3.52 Linear vibrations BK-3.53 Waves BK-3.54 Physical Optics BK-3.55 Geometric Optics BK-3.56 Propagation of light BK-3.57 Coulomb's Law BK-3.58 Static electric field BK-3.59 Work and potential energy BK-3.60 Conductors, insulators and semiconductors BK-3.61 Capacitors BK-3.62 Electrostatics BK-3.63 Electric current BK-3.64 Magnetic fields BK-3.65 Magnetism |



| PLO | Description of Programme PLO | Study Materials |
|-------|---|---|
| | | BK-3.66 Maxwell's Equations BK-3.67 Maxwell's Equations BK-3.68 Wave Polarisation BK-3.69 Theory of Relativity BK-3.70 History of quantum physics BK-3.71 Schrödinger's Equation BK-3.72 Applications of the Schrödinger Equation BK-3.73 Physics Experiments BK-3.74 Structure and properties of the atomic nucleus BK-3.75 Radioactivity BK-3.76 Types of Nuclear Radiation BK-3.77 Nuclear Reactions BK-3.78 Elementary Particles BK-3.79 Kinetic theory of ideal gases BK-3.80 Maxwell's Equations BK-3.81 Crystal structure BK-3.82 Crystal lattice dynamics BK-3.83 Free-electron model BK-3.84 Energy Band Theory BK-3.85 Semiconductor Materials BK-3.86 Dielectric Materials BK-3.87 Environmental Physics BK-3.88 Introduction to Astronomy BK-3.89 Biology BK-3.90 Chemistry BK-10.1 Electronics Safety BK-10.2 Electronic Components and Instrumentation BK-10.3 PCB Assembly and Wiring System Installation BK-10.4 Diagnosis and repair of faults in electronic devices BK-10.5 Fabrication of electronic circuit prototypes using conventional methods and E-CAD BK-10.6 Designing embedded programming systems on microcontrollers and various interfaces |
| PLO-4 | Able to design, implement, manage, and evaluate secondary school physics learning independently and innovatively using a scientific approach, based on pedagogical content knowledge and instructional design principles, as well as effectively utilising science and technology and learning resources (including laboratories) to develop students' scientific thinking skills | BK 1.15 1. Mastery of the field of educational science 2. Knowledge of the Programme's Academic Discipline 3. Understanding of students BK 1.16 Learning BK 1.17 1. Learning 2. Knowledge of the field of physics BK 1.18 1. Learners' understanding 2. Learning 3. Mastery of educational science 4. Knowledge of the academic field of the study programme BK 2.1 Foundations of Education |



| PLO | Description of Programme PLO | Study Materials |
|-------|---|---|
| | | BK 2.2 Student Development BK 2.6 21st-century skills BK 2.7 Basic teaching skills BK 2.8 Physics Instructional Design BK 2.16 Aspects of Assessment BK 2.17 Computer-assisted assessment of literacy, numeracy and higher-order thinking skills BK 2.22 The Classroom as a Physics Laboratory BK-2.29 Probability BK-4.1 Micro Lesson Plan (RPP) BK-4.2 Eight basic teaching skills BK-4.3 Application of learning media and technology BK-4.4 Teaching simulation practice (<i>microteaching</i>) BK-4.5 Learning evaluation and reflection |
| PLO-5 | Able to apply concepts of classical and modern physics, mathematics, and instrumentation and software technology to analyse and solve physics problems accurately and systematically. | BK-3.1 Functions BK-3.2 Limits BK-3.3 Derivatives BK-3.4 Integrals BK-3.5 Matrix operations BK-3.6 Complex numbers BK-3.7 Series BK-3.8 Complex Algebra and Functions BK-3.9 Ordinary Differential Equations BK-3.10 Partial Differential Equations BK-3.11 Integral transforms BK-3.12 Systems of linear equations BK-3.13 Variational calculus BK-3.14 Computer programming BK-3.15 Introduction to Numerical Methods BK-3.16 DC Circuits BK-3.17 Thevenin's and Norton's Theorems BK-3.18 AC Circuits BK-3.19 Semiconductors BK-3.20 Testing the performance of analogue electronics BK-3.21 Electrical Measurement Instruments BK-3.23 Sensor Devices BK-3.24 Digital electronics performance testing BK-3.28 Newton's Concept of Space-Time BK-3.29 Fundamental quantities of motion BK-3.30 Types of motion BK-3.31 Analysis of particle motion BK-3.32 Newton's Laws BK-3.33 Applications of Newton's Laws BK-3.34 Work and energy BK.3.35 Gravity BK-3.36 Fluid Concepts BK-3.37 Ideal Fluids BK-3.38 Viscous Fluids |



| PLO | Description of Programme PLO | Study Materials |
|-----|------------------------------|---|
| | | BK-3.39 Temperature and heat BK-3.40 Transport Phenomena BK-3.41 Thermodynamic Systems BK-3.42 The zeroth law of thermodynamics BK-3.43 Ideal gases BK-3.44 The First Law of Thermodynamics BK-3.45 The second law of thermodynamics: entropy, the principle of maximum entropy, the Carnot process BK-3.46 Entropy BK-3.47 Motion of a system of many particles BK-3.48 Motion of rigid bodies BK-3.49 Non-inertial reference frames BK-3.50 Lagrangian and Hamiltonian formulations BK-3.51 Motion in a central force field BK-3.52 Linear vibrations BK-3.53 Waves BK-3.54 Physical Optics BK-3.55 Geometric Optics BK-3.56 Propagation of light BK-3.57 Coulomb's Law BK-3.58 Static electric field BK-3.59 Work and potential energy BK-3.60 Conductors, insulators and semiconductors BK-3.61 Capacitors BK-3.62 Electrostatics BK-3.63 Electric current BK-3.64 Magnetic fields BK-3.65 Magnetism BK-3.66 Maxwell's Equations BK-3.67 Maxwell's Equations BK-3.68 Wave Polarisation BK-3.69 Theory of Relativity BK-3.70 History of quantum physics BK-3.71 Schrödinger's Equation BK-3.72 Applications of the Schrödinger Equation BK-3.73 Physics Experiments BK-3.74 Structure and properties of the atomic nucleus BK-3.75 Radioactivity BK-3.76 Types of Nuclear Radiation BK-3.77 Nuclear Reactions BK-3.78 Elementary Particles BK-3.79 Kinetic theory of ideal gases BK-3.80 Maxwell's Equations BK-3.81 Crystal structure BK-3.82 Crystal lattice dynamics BK-3.83 Free-electron model BK-3.84 Energy Band Theory BK-3.85 Semiconductor Materials BK-3.86 Dielectric Materials |



| PLO | Description of Programme PLO | Study Materials |
|-------|--|---|
| | | BK-3.87 Environmental Physics BK-3.88 Introduction to Astronomy BK-3.89 Biology BK-3.90 Chemistry |
| PLO-6 | Able to conduct research and scientific studies in the field of physics education as an alternative problem-solving approach to produce published scientific papers | BK-6.1 Drafting a research proposal BK-6.2 Conducting physics research in physics education BK-6.3 Writing up research findings BK-6.4 The publication process |
| PLO-7 | Able to make appropriate decisions based on the analysis of information and data in the field of physics education, and able to provide guidance in selecting various alternative solutions, both independently and in groups. | BK 1.15 1. Mastery of the academic field of education 2. Knowledge of the programme's academic discipline 3. Understanding of learners BK 1.16 Teaching BK 1.17 1. Learning 2. Knowledge of the field of physics BK 1.18 1. Learners' understanding 2. Learning 3. Mastery of educational science 4. Knowledge of the academic discipline of the degree programme BK 2.3 Theories of learning and teaching in physics BK 2.4 <i>Revised Bloom's Taxonomy</i> BK 2.5 Philosophy of physics BK 2.7 Basic teaching skills BK 2.9 <i>English for physics instruction</i> BK 2.11 Development of teaching materials and learning media BK 2.13 Physics curriculum for Year 10 secondary school BK 2.14 Physics curriculum in Year 11 secondary schools BK 2.16 Aspects of assessment BK 2.17 Computer-assisted assessment of literacy, numeracy and higher-order thinking skills BK 2.18 Item analysis BK 2.19 The nature of research BK 2.20 Problem identification BK 2.21 Research methods in physics education BK 2.24 Health, Safety and Welfare in the Physics Laboratory |
| PLO-8 | Takes responsibility for the field of physics education and can be entrusted with responsibility for the achievement of group work outcomes. | BK 1.14 Community Empowerment BK 2.1 Foundations of Education BK 2.4 <i>Revised Bloom's Taxonomy</i> BK 2.5 Philosophy of Physics BK 2.6 21st-century skills BK 2.7 Basic teaching skills |



| PLO | Description of Programme PLO | Study Materials |
|--------|---|---|
| | | BK 2.9 English for Physics Instruction BK 2.10 Academic Writing for Physics Education Research BK 2.12 Video, Animation and Graphic Design BK 2.13 Physics Curriculum for Year 10 Secondary School BK 2.14 Physics curriculum in Year 11 secondary schools BK 2.17 Computer-assisted assessment of literacy, numeracy and higher-order thinking skills BK 2.21 Research Methods in Physics Education BK 2.23 Laboratory Management BK 2.25 Principles of scientific writing BK-4.4 Teaching simulation practice (microteaching) |
| PLO-9 | Ability to creatively and contextually develop innovative technology-based multimedia learning resources, and to manage educational products as a form of entrepreneurship in the field of education | BK 2.11 Development of teaching materials and learning media BK 9.1 Creative multimedia research BK 9.2 Multimedia project proposal BK 9.3 Visual direction (<i>storyline</i>) BK 9.4 Visual assets (graphic design, animation, graphic video) BK 9.5 Integration of all multimedia components relating to audio and visuals |
| PLO-10 | Able to independently develop prototype electronics-based systems or products and software. | BK-10.1 Electronics health and safety BK-10.2 Electronic components and instrumentation devices BK-10.3 PCB assembly and wiring system installation BK-10.4 Diagnosis and repair of faults in electronic devices BK-10.5 Fabrication of electronic circuit prototypes using conventional methods and E-CAD BK-10.6 Designing embedded programming systems on microcontrollers and various interfaces |
| PLO-11 | Evaluating and integrating concepts of religion, nationality, the constitution, language, and technology-based entrepreneurship with the 5A values (anti-violence, anti-drugs, anti-bullying, anti-intolerance, and anti-corruption) to support the development of professional knowledge and practice. | BK 1.1 Islam BK 1.2 Christianity BK 1.3 Catholicism BK 1.4 Buddhism BK 1.5 Hinduism BK 1.6 Confucianism BK 1.7 Pancasila Education BK 1.8 Civics Education BK 1.9 1. The nature of Indonesian as the language of unity and the national language; 2. Exploring texts in academic life (instilling values and the nature of the Indonesian language as a vehicle for knowledge); 3. Exploring the world of literature; 4. Designing research proposals and activity proposals; |



| PLO | Description of Programme PLO | Study Materials |
|-----|------------------------------|---|
| | | <p>5. Reporting research findings and activity outcomes; and 6. Expressing oneself in academic articles.</p> <p>BK 1.10 PGRI Studies BK 1.11</p> <ol style="list-style-type: none">1. <i>Simple Present Tense</i>2. <i>Present Continuous Tense</i>3. <i>Simple Past Tense</i>4. <i>Present Perfect Tense</i>5. <i>Simple Future Tense</i> <p>BK 1.12</p> <ol style="list-style-type: none">1. <i>Design thinking</i>2. <i>Business Model Canvas</i>3. <i>Prototyping</i> <p>BK 1.13</p> <ol style="list-style-type: none">1. <i>Marketing Plan and Channels</i>2. <i>Planning and Strategising</i>3. <i>Unit Product Cost & Pricing Method</i>4. <i>Business Planning & Feasibility Study</i>5. <i>Intention to Become an Entrepreneur</i>6. <i>Communication & Negotiation Skills</i> <p>BK 1.14 Community Empowerment</p> |



5.2 Description of Study Materials

Table 5.3. Course Materials (BK)

| No/Code | Study Material (BK) | Description of Study Material |
|---------|---------------------|---|
| RM-1.2 | Christianity | <ol style="list-style-type: none"> 1. God the Creator: Creating, saving and accompanying. 2. Human beings, God's creation: Created in the image and likeness of the Creator. 3. Christian Ethics, Morals and Character: Against sexual abuse. 4. Human Rights and Responsibilities. 5. Faith, Knowledge and Service. 6. Christianity and Culture. 7. Interfaith Harmony: Building Tolerance. 8. Diversity as a Reality. 9. Human Rights: Humanising Humanity: Anti-Bullying. 10. Democracy. 11. Work as a Mandate from God: Anti-Corruption. 12. The Relationship between Religion and the State according to Christianity. 13. The Law of Love: The foundation of Christian life in all aspects of life. |
| BK-1.1 | Islam | <ol style="list-style-type: none"> 1. Humanity and Religion. 2. The concepts of faith, Islam and ihsan in shaping the perfect human being. 3. The concepts of ethics, morality and good character (anti-corruption, anti-bullying, anti-intolerance, anti-sexual violence, anti-drugs). 4. Grounding Islam in Indonesia. 5. Islam fosters unity amidst diversity. 6. Islam and the challenges of modernisation. 7. Islam's contribution to the development of world civilisation. 8. Democracy and human rights from an Islamic perspective. 9. Islamic Politics and Law. |
| BK-1.3 | Catholicism | <ol style="list-style-type: none"> 1. Who is man according to the Bible? 2. Reasoning, exploring arguments, understanding and the nature of humanity as the image of God. 3. Communicating the calling and mission of humanity as the image of God. 4. Exploring the relationship of human beings with themselves, others, the environment and God. 5. Communicating humanity's relationship with oneself, others, the environment and God. 6. Religion as the completion of the understanding of the macrocosm and microcosm. 7. The lived experience of religious life within the Catholic Church. 8. The meaning of religious pluralism. 9. Interfaith cooperation for the sake of integral human development. 10. A personal encounter with Jesus in the Bible. 11. The meaning of the Passion, death and resurrection of Jesus Christ. 12. The Meaning of the Trinity. 13. The nature and mission of the Catholic Church for the preservation of life. 14. Living out the faith in a pluralistic society. 15. Faith for the creation of Pancasila-based builders. |
| BK-1.4 | Buddhism | <ol style="list-style-type: none"> 1. A study of the concept of sādḍha in the suttas (e.g. Sāleyyaka Sutta, Kalama Sutta), the typology of sādḍhā (buttika, ākāra, |



| No/Code | Study Material (BK) | Description of Study Material |
|---------|---------------------|--|
| | | <p>bala), the function of saddhā in the spiritual life of Buddhists, and the strengthening of faith through practice.</p> <ol style="list-style-type: none"> 2. Contemporary issues such as secularism, spiritual crisis, and pluralism; the Buddhist approach to the concept of Divinity (without a creator), the relevance of nibbāna and brahmavihāra in addressing contemporary spiritual needs. 3. Buddhist perspectives on anattā, dukkha, paṭiccasamuppāda, and nibbāna; the dignity of human beings as moral beings with the potential for enlightenment; the relevance of these teachings in addressing the questions of modern life. 4. Teachings on dāna, sīla, karuṇā, mettā, and samacariya; the role of the Buddhist community in social, economic, and educational development; Buddhist contributions to national values and public cooperation. 5. Historical studies of the role of Buddhists in the state; the principles of pañca-sīla and dasa vidha-rājadhamma; the contribution of Buddhist values in fostering social justice, the rule of law, and a culture of compassion. 6. The ethics of dāna as the basis for public contribution; the teaching of lokasamgraha (worldly maintenance); tax awareness as a form of secular dāna; the value of nationalism in Indonesian Buddhism. 7. Teachings on gender equality in the suttas (e.g. the Therīgāthā, the Sutta Nipāta); the principle of non-violence (ahiṃsā); lay participation in social movements and the strengthening of democracy based on Buddhist values. 8. Suttas on tolerance and dialogue (e.g. Kalama Sutta, Cūḷekasāla Sutta); the history of Buddhist pluralism in India and Southeast Asia; the concept of the Middle Way (majjhima paṭipadā) as the basis for religious moderation. 9. Interfaith education strategies; interfaith dialogue forums based on mettā-karuṇā; case studies of religious pluralism; legal analysis of religious freedom in the context of Indonesia and Buddhism. |
| BK-1.5 | Hinduism | <ol style="list-style-type: none"> 1. Study of the concept of śraddhā in the Vedas, Upaniṣads, and the Bhagavad Gītā; typology of faith (trividha śraddhā in Gītā 17:2–3); the function of śraddhā in the spiritual growth of Hindus; strengthening of faith through the practice of yajña, tapa, and dharma. 2. Contemporary issues such as materialism, secularism, and popular spirituality; the Hindu approach to immanent-transcendent Divinity (Brahman and Īśvara); the relevance of mokṣa, ātman, and bhakti yoga in addressing modern spiritual needs. 3. The Hindu view of ātman, saṃsāra, karma, and mokṣa; the dignity of humanity as dharmic beings capable of attaining the highest consciousness; the relevance of these teachings in addressing the modern search for the meaning of life. 4. The teachings of dāna, seva, ahimsa, and kṣānti; the role of Hindus in social development and education; tangible contributions to economic development and national values in the spirit of dharma yuddha. 5. A historical study of the role of Hindus in the states and kingdoms of the Nusantara; the principles of pañca yadnya and rājadharma in state governance; the contribution of Hindu values to the ethics of governance, law, and the culture of the Nusantara. 6. The ethics of dāna and yajña as forms of social responsibility; the |



| No/Code | Study Material (BK) | Description of Study Material |
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| | | <p>concept of lokasaṅgraha in the Bhagavad Gītā (3:20–25); tax awareness as seva for the state; the value of patriotism in the practice of karma yoga among Indonesian Hindus.</p> <ol style="list-style-type: none"> 7. Teachings on gender equality in the Vedas and the Mahābhārata (e.g. the stories of Sulabhā and Draupadī); the principle of non-violence (ahimsā) in social relations; the contribution of Hindus to social movements and dharma-based democracy. 8. Teachings on tolerance in the Vedas: ekaṁ sat viprā bahudhā vadanti; interfaith dialogue in the Upaniṣads and the Gītā; the history of Hindu pluralism in India and the Archipelago; the principles of madhyama mārga and sarva dharma sambhava in the practice of religious moderation. 9. Strategies for interfaith education and dharmic dialogue; forums for harmony based on the values of ṛta and satya; case studies of Hindu tolerance in Bali and Java; analysis of religious freedom according to the 1945 Constitution and the inclusive stance of Hindu teachings." |
| BK-1.6 | Confucianism | <ol style="list-style-type: none"> 1. Study of the concept of xin (faith) in the Analects, the Doctrine of the Mean, and the Works of Mencius; typologies of xin in relation to zhong, shu, and cheng (sincerity); the function of faith in the moral and spiritual lives of the faithful; strengthening of faith through the daily practices of li and xiu shen. 2. Contemporary issues such as hedonism, the ethical crisis, and secularism; the Confucian view of Tian (Heaven) as the source of moral order; the relevance of dao, ren, and ming in addressing the spiritual void of the modern age. 3. The Confucian view of human nature (xing) as inherently good; the value of the junzi as humanity's noble potential; the interconnection between moral cultivation (xiu shen) and social harmony; the application of these teachings to address contemporary existential questions. 4. The teachings of ren, yi, li, zhong, shu, and xin in social life; moral obligations towards family and state; the tangible contributions of Confucians in the social, educational, and national spheres; the practices of gong (co-operation) and xiao (filial piety) in fostering harmony. 5. Historical study of the role of Confucian communities within the state; moral practices based on da xue (great learning) and zhong yong (balance); the contribution of the value of he (harmony) in realising a compassionate legal system and social culture. 6. The concept of li as a civil order and public ethics; the value of dāna in social forms through gong de (collective virtue); taxation as a civic duty to ensure national harmony; patriotism as an expression of zhong (loyalty) towards the state. 7. The doctrine of equality in classical Confucianism (e.g., Ren applies universally); the spirit of non-violence and Wen (civilisation); the role of Confucius in education and social reform; the contribution of the Confucian community to the strengthening of democratic values. 8. The attitude of tolerance in the Zhong Yong and Lun Yu; the principle of he er bu tong (harmony without uniformity); the history of Confucian pluralism in East Asia and Southeast Asia; the practice of zhong-shu as the basis for interfaith dialogue and religious moderation. 9. Interfaith education strategies based on the values of Ren and Yi; the development of interfaith and humanitarian forums; case studies of the role of Confucian figures in religious harmony; |



| No/Code | Study Material (BK) | Description of Study Material |
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| | | analysis of the constitution and guarantees of religious freedom within the context of Confucian values. |
| BK-1.7 | Pancasila Education | <ol style="list-style-type: none"> 1. The history and objectives of Pancasila Education. 2. Pancasila as the national identity. 3. Pancasila in the context of the 1945 Constitution. 4. Pancasila as the foundation of the state. 5. Pancasila as the ideology of the nation and state. 6. Pancasila as a philosophical system. 7. Pancasila and state policy. 8. Pancasila as an ethical system. 9. The actualisation of Pancasila values in the 5A campaign: anti-corruption, anti-intolerance, anti-bullying, anti-sexual violence, and anti-drugs. 10. The correlation between the state law of “Pancasila” and religious law. 11. Pancasila as the foundation for the development of science. 12. Pancasila as a paradigm of science. 13. Pancasila as a paradigm for national life. |
| BK-1.8 | Civic Education | <ol style="list-style-type: none"> 1. Introduction to Civics Education. 2. Indonesian National Identity and Anti-Intolerance. 3. Concepts, urgency, formative factors, and challenges in achieving national unity amidst diversity. 4. The Development and Implementation of the Constitutional System of the Republic of Indonesia. 5. Indonesian Civics. 6. Indonesian Democracy. 7. Human Rights (HR), Anti-Bullying and Anti-Sexual Violence. 8. Judicial Violations and the Enforcement of Human Rights. 9. The Archipelagic Concept. 10. Implementation of the Archipelagic Outlook in National Life. 11. National Resilience. 12. National Strategic Policy. 13. How to Measure Indonesia’s Territorial Waters and Airspace. 14. Regional Autonomy, Anti-Corruption and Anti-Drugs. |
| BK-1.9 | <ol style="list-style-type: none"> 1. The nature of Indonesian as the language of unity and the national language; 2. Exploring texts in academic life (instilling values and the nature of the Indonesian language as a vehicle for knowledge); 3. Exploring the world of libraries; 4. Designing research proposals and activity proposals; 5. Reporting research findings and activity outcomes; and 6. Expressing oneself in academic articles. | The General Indonesian Language Course is offered to students as a general course to reinforce foundational subjects, covering the history of the Indonesian language; linguistic rules, such as spelling, sentence structure and paragraphing; rules for academic writing; and ethical writing guidelines, including rules for bibliographies and citations, both direct and indirect. |
| BK-1.10 | PGRI Studies | <ol style="list-style-type: none"> 1. History and Dynamics of PGRI. 2. The Nature and Identity of PGRI. 3. Profile of the Pancasila Student. 4. The Role of PGRI in Improving the Quality of Human Resources. 5. PGRI Organisational Ethics. |



| No/Code | Study Material (BK) | Description of Study Material |
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| | | 6. PGRI and Social Media. 7. Challenges Facing PGRI in the Age of Disruption. |
| BK-1.11 | 1. <i>Simple Present Tense</i> 2. <i>Present Continuous Tense</i> 3. <i>Simple Past Tense</i> 4. <i>Present Perfect Tense</i> 5. <i>Simple Future Tense</i> . | 1. <i>Simple Present Tense</i> : simple sentences in the affirmative, negative and interrogative forms using the <i>simple present tense</i> pattern with 'to be' and the base verb. 2. <i>Present Continuous Tense</i> : simple sentences in the affirmative, negative and interrogative forms using the <i>present continuous tense</i> pattern with the verb + -ing. 3. <i>Simple Past Tense</i> : simple sentences in the affirmative, negative and interrogative forms using the <i>simple past tense</i> pattern with 'to be' and the past tense form of the verb. 5. <i>Present Perfect Tense</i> : simple sentences in the affirmative, negative and interrogative forms using the <i>present perfect tense</i> pattern with 'has' and 'have'. 6. <i>Simple Future Tense</i> : simple sentences in the affirmative, negative and interrogative forms using the <i>simple future tense</i> pattern: will and be going to. 7. <i>Descriptive Text</i> . 8. <i>Procedure Text</i> . 9. <i>Recount text</i> . |
| BK-1.12 | 1. <i>Design thinking</i> 2. <i>Business Model Canvas</i> 3. <i>Prototyping</i> | 1. <i>Design thinking, mentoring, exhibition & investor pitching</i> . 2. <i>Business Model Canvas, presentation and review of the Business Model Canvas</i> . 3. <i>Prototyping</i> . |
| BK-1.13 | 1. <i>Marketing Plan and Channels</i> 2. <i>Planning and Strategising</i> 3. <i>Unit Product Cost & Pricing Method</i> 4. <i>Business Planning & Feasibility Study</i> 5. <i>Intention to become an entrepreneur</i> 6. <i>Communication & Negotiation Skills</i> | 1. Marketing management: STP, marketing mix, and SWOT analysis. Marketing management: digital marketing, branding. 2. Human Resources & Operational Management: job analysis and supply chain. 3. Financial management: financial projections & working capital requirements. 4. Business plan preparation & business feasibility testing. 5. Visits to SME partners. 6. Business communication & analysis of startup needs. |
| BK-1.14 | Community Empowerment | Implementation of national awareness, the philosophy of Community Service Learning (CSL), community potential and issues, work programme planning, group dynamics, the community's socio-cultural system, multi-stakeholder collaboration in programme implementation, and the role of students in CSL. |
| BK-1.15 | 1. Mastery of the field of educational science 2. Knowledge of the Programme's Academic Discipline 3. Understanding of learners | 1. Objectives, content, learning experiences, and assessment within the educational institution's curriculum. 2. Curriculum development in accordance with the scope of duties. 3. Management of the curriculum at the school level. 4. Scope of subject matter within the programme of study. 5. Educational learning services tailored to the characteristics of the learners. |
| BK-1.16 | Learning | 1. Learning approaches and models, teaching materials, and assessment for learning purposes. 2. The application of information and communication technology in learning planning, delivery, evaluation and management. 3. Improving the quality of learning based on process assessment and assessment of learning outcomes. 4. Development of a learning environment that is safe, comfortable, enjoyable, challenging, and fosters creativity in learners. |
| BK-1.17 | 1. Learning | 1. Learning theories, teaching approaches and models, and teaching |



| No/Code | Study Material (BK) | Description of Study Material |
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| | 2. Knowledge of the field of physics | <p>materials.</p> <p>2. Application of information and communication technology in lesson planning.</p> <p>3. Scope of subject matter within the programme of study.</p> |
| BK-1.18 | <p>1. Understanding of Learners</p> <p>2. Learning</p> <p>3. Mastery of the academic discipline of education</p> <p>4. Knowledge of the academic discipline of the study programme</p> | <p>1. Characteristics of learners from physical, psychological, social, and cultural perspectives for the purposes of learning.</p> <p>2. Educational services tailored to learners' characteristics.</p> <p>3. Learning theories, teaching approaches and models, teaching materials, and assessment for the purposes of learning.</p> <p>4. Application of information and communication technology in learning planning, delivery, evaluation and management.</p> <p>5. Improvement of learning quality based on process assessment and assessment of learning outcomes.</p> <p>6. The development of a learning environment that is safe, comfortable, enjoyable, challenging, and fosters learners' creativity.</p> <p>7. Objectives, content, learning experiences, and assessment within the school curriculum.</p> <p>8. Curriculum management at the school level.</p> <p>9. Professional ethics in education.</p> <p>10. Scope of subject matter within the programme of study.</p> |
| BK-1.19 | Academic ethics in scientific publications | Academic ethics in scientific publications and the writing of scientific works are based on the values of honesty, integrity, and scientific responsibility. |
| BK-1.20 | Teacher Professional Ethics | <p>1. Professional ethics and conduct when teaching.</p> <p>2. Discipline, responsibility, and effective communication.</p> |
| BK-2.1 | Foundations of Education | The basis or starting point for the delivery of education, encompassing philosophical, sociological, cultural, psychological and legal foundations. |
| BK-2.2 | Student Development | Theories of learner development and their implications for physics learning. |
| BK-2.3 | Theories of learning and physics teaching | Theories of learning in physics teaching (behaviourist, cognitive, constructivist, social, and humanistic) and their development. |
| BK-2.4 | <i>Revised Bloom Taxonomy</i> | <i>The Revised Bloom Taxonomy</i> , which encompasses the dimensions of cognitive processes and knowledge. |
| BK-2.5 | Philosophy of physics | The nature of science, the scope of the philosophy of science (ontology, epistemology, and axiology), and the development of scientific paradigms and revolutions in the history of science. The characteristics and structure of physics within a philosophical context, including an analysis of the contributions of philosophers of science such as Popper, Kuhn, Lakatos, and Feyerabend. The ethics and responsibilities of scientists in the development and application of scientific knowledge. |
| BK-2.6 | 21st-century skills | Literacy, numeracy and higher-order thinking skills. |
| BK-2.7 | Basic teaching skills | Basic teaching skills and the management of physics learning (skills in opening and closing lessons, asking questions, explaining, providing reinforcement, introducing variety, managing the class, leading small-group discussions, and teaching small groups and individuals). |
| BK-2.8 | Physics lesson design | Approaches, models and methods of physics learning and their implementation (contextual approach, scientific approach, science process skills, <i>discovery learning model</i> , <i>inquiry-based learning</i> , <i>problem-based learning</i> , <i>project-based learning</i> , <i>cooperative learning</i> and <i>case-based learning</i>). |
| BK-2.9 | <i>English for physics instruction</i> | Basic and advanced physics concepts, using scientific terminology in English appropriate to the students' level of understanding. |



| No/Code | Study Material (BK) | Description of Study Material |
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| BK-2.10 | <i>Academic Writing for Physics Education Research</i> | Searching for, selecting, and understanding scientific literature from internationally reputable journals (<i>Scopus/WoS indexed</i>) relevant to physics education research topics, as well as drafting scientific articles in IMRaD format (<i>Introduction, Method, Results, and Discussion</i>) using good and correct academic English. |
| BK-2.11 | Development of teaching materials and learning media | Development of teaching materials and learning media based on the local environment and technology. |
| BK-2.12 | Video, animation and graphic design | Theoretical and practical study of the principles of visual communication through video, animation and graphic design. |
| BK-2.13 | The Physics Curriculum in Year 10 of secondary school | The Physics curriculum in secondary schools (characteristics, structure, framework, depth of subject matter). |
| BK-2.14 | Physics Curriculum in Secondary School Year 11 | Physics curriculum in secondary schools (characteristics, structure, framework, depth of subject matter). |
| BK-2.15 | <i>Assessment as, for and of learning</i> | <i>Assessment as, for and of learning.</i> |
| BK-2.16 | Aspects of assessment | Aspects of assessment, development of assessment instruments (cognitive, psychomotor, affective). |
| BK-2.17 | Computer-assisted assessment of literacy, numeracy and HOTS | Computer-assisted assessment of literacy, numeracy and HOTS. |
| BK-2.18 | Item analysis | Item analysis (PAN: validity, reliability; PAP: sensitivity index, content validity). |
| BK-2.19 | The nature of research | The nature and paradigms of physics research and physics education. |
| BK-2.20 | Problem identification | Problems and Objectives of Research in Physics and Physics Education; Literature Review and Literature Survey, Formulation of Hypotheses and Research Focus. |
| BK-2.21 | Research methods in physics education | Varieties of research methods in physics and physics education: quantitative, qualitative, action research (PTK), and R&D. Research Instruments and Validity. Data Collection Techniques. Data Analysis Techniques. |
| BK-2.22 | The Function of the Classroom as a Physics Laboratory | Understanding the concepts and principles of physics laboratory management by integrating technology and the environment. |
| BK-2.23 | Laboratory management | Laboratory management (planning of equipment and materials, scheduling of use, maintenance, and calibration). |
| BK-2.24 | Health, safety and security in the physics laboratory | Health, safety and occupational safety in the laboratory. |
| BK-2.25 | Principles of scientific manuscript preparation | Principles of research methodology in physics education as the basis for drafting scientific publications. Use of ICT (such as <i>reference managers, publication software, online journals</i>). |
| BK-2.26 | Principles of scientific writing | The structure of a physics education research proposal based on the results of problem identification using appropriate research methods. |
| BK-2.27 | Basic concepts of microteaching | 1. Definition, objectives, benefits, and principles of microteaching. 2. The relationship between microteaching and student teaching (PPL) and professional teaching practice. 3. Teacher competency standards (Government Regulation No. 19/2005, SN-Dikti, and LAMDIK). |
| BK-2.28 | Teachers' pedagogical competencies | 1. Teacher learning outcomes. 2. Analysis of learning needs. 3. The role of teachers in 21st-century learning. |
| BK-2.29 | Probability | Definition of probability, sample space, calculation methods, random variables, continuous distributions, binomial distribution, normal (Gaussian) distribution, Poisson distribution. |
| BK-1.15 | Mastery of educational | Curriculum development in accordance with the field of |



| No/Code | Study Material (BK) | Description of Study Material |
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| | disciplines | responsibility. |
| BK-1.16 | Teaching | Application of information and communication technology in lesson planning, delivery, assessment and management. |
| BK-1.17 | Learning | The application of information and communication technology in lesson planning. |
| BK-1.18 | Learning | Theories of learning and teaching, approaches and models of learning, teaching materials, and assessment for learning. |
| BK-6.2 | Conducting research in physics education | Conducting research in physics education based on a research proposal and presenting it orally in an examination forum in accordance with scientific principles, procedures and ethics. |
| BK-6.3 | Writing research results | Writing research results in the form of a thesis or final project report and publishing them as a scientific article, which must be uploaded to the university's website, prioritising originality to prevent plagiarism. |
| BK-3.1 | Functions | Functions: description of functions, types of functions (even/odd, exponential, trigonometric, logarithmic, inverse), graphs. |
| BK-3.2 | Limits | Limits: limit laws, limit theorems, continuity of functions. |
| BK-3.3 | Derivatives | Derivatives: rules for finding derivatives, the chain rule and Leibniz notation; higher-order derivatives, implicit differentiation. |
| BK-3.4 | Integral | Integrals: definite integrals, indefinite integrals, integration rules, integration techniques. |
| BK-3.5 | Matrix operations | Matrix operations: addition, multiplication, transpose, determinant, inverse, special matrices, orthogonal matrices, eigenvalues. |
| BK-3.6 | Complex numbers | Series: infinite series, power series, convergence tests and regions of convergence of series, expansion of functions into power series, Fourier series. |
| BK-3.7 | Series | Series: infinite series, power series, convergence tests and regions of convergence of series, expansion of functions into power series, Fourier series. |
| BK-3.8 | Algebra and complex functions | Algebra and complex functions, analytic functions, line integrals, Laurent series, residue theory, conformal mapping. |
| BK-3.9 | Ordinary differential equations | Ordinary differential equations (ODEs): solutions to ODEs (separation of variables, Bessel and Legendre series expansions), non-homogeneous ODEs. |
| BK-3.10 | Partial differential equations | Partial differential equations (PDEs): wave equations, Laplace and Poisson equations, heat and diffusion equations, solutions using the method of separation of variables. |
| BK-3.11 | Integral transforms | Integral transforms: Laplace transform, Fourier transform, convolution, Green's function, solutions to PDEs using transforms; integral equations. |
| BK-3.12 | Systems of linear equations | Systems of linear equations, matrices, determinants; vector addition and multiplication, scalar fields, vector fields, gradient, divergence, curl, Green's theorem, Gauss's theorem, Stokes' theorem; linear transformations, orthogonal transformations, eigenvalue problems, diagonalisation; coordinate transformations, curvilinear coordinates. |
| BK-3.13 | Calculus of Variations | Calculus of Variations: Euler's equation. |
| BK-3.14 | Computer programming | Hardware, software and programming languages; introduction to Python (Google Colab, variables, NumPy, Matplotlib); visualisation. |
| BK-3.15 | Introduction to numerical methods | Introduction to numerical methods for solving polynomial equations, linear equations and differential equations. |
| BK-3.16 | DC circuits | DC circuits, current sources and voltage sources. |
| BK-3.17 | Thevenin's and Norton's Theorems | Thevenin Equivalent Circuit, Norton Equivalent Circuit. |
| BK-3.18 | AC circuits | AC Circuits. |
| BK-3.19 | Semiconductors | Semiconductors, PN junctions, diodes, waveform rectifiers, DC |



| No/Code | Study Material (BK) | Description of Study Material |
|---------|--|---|
| | | power supplies, Zener diodes, Bipolar Transistors, transistor characteristics, AC and DC load lines, transistors as small-signal amplifiers, transistor switches. |
| BK-3.20 | Analogue electronics performance testing | Performance of resistors, conductors, capacitors, transistors. |
| BK-3.21 | Electrical measurement instruments | Basic measuring instruments: ammeters, voltmeters, ohmmeters. |
| BK-3.22 | Logic gates | Digital circuit theory: AND, OR, NOT, NAND, NOR, XOR. |
| BK-3.23 | Sensor devices | Input devices: sensors, types of sensors: temperature sensors, mechanical quantity sensors, optical sensors, magnetic sensors, and other sensors. |
| BK-3.24 | Digital electronics performance testing | Performance of logic gates (and, or, not, nor, xor, etc.). |
| BK-3.25 | Simple signal processing | Simple signal processing: signal pre-processing, signal amplifiers, analogue-to-digital converters, microprocessor basics, signal-to-noise ratio enhancement. |
| BK-3.26 | Output devices | Output devices: the operating principles of output devices such as memory, displays and printers. |
| BK-3.27 | Digital data transmission | Digital data transmission. |
| BK-3.28 | Newton's concept of space-time | Space and time (Newton's and Galileo's concepts of space-time). |
| BK-3.29 | Basic quantities of motion | Basic quantities of motion: reference frame, position, displacement, distance travelled (path length), speed (average and instantaneous), linear velocity (average and instantaneous), linear acceleration (average and instantaneous), angular velocity (average and instantaneous), and angular acceleration (average and instantaneous). |
| BK-3.30 | Types of motion | Types of motion: motion in a straight line, motion in a plane, motion in space, relative motion (relative position and velocity). |
| BK-3.31 | Analysis of particle motion | Analysis of the motion of a particle in curved coordinates (polar, spherical, cylindrical). |
| BK-3.32 | Newton's laws | Newton's laws of motion: Newton's laws of motion, inertial reference frames, inertial mass and gravitational mass, force and momentum, torque and angular momentum (relative to the coordinate centre and other points), and Newton's laws for rotational motion. |
| BK-3.33 | Application of Newton's Laws | Applications of Newton's laws of motion: equilibrium of a point mass, time-dependent forces (e.g. impulse), position-dependent forces (e.g. restoring force, gravitational force), velocity-dependent forces (e.g. <i>Stokes' force</i> , <i>drag force</i>), and their combinations (e.g. spring force and friction). |
| BK-3.34 | Work and energy | The concepts of work and energy, the work-kinetic energy theorem, conservative forces and potential energy, the law of conservation of energy, and their applications. |
| BK-3.35 | Gravity | Newton's laws of gravitation: gravitation in systems of point particles and continuous bodies, gravitational potential energy. |
| BK-3.36 | Fluid concepts | Fluid concepts, Eulerian and Lagrangian descriptions, the concept of particles in a fluid, flow lines, path lines, and streamlines, the continuity equation for incompressible fluids. |
| BK-3.37 | Ideal fluids | Ideal fluids: Euler's equations, Bernoulli's equation, hydrostatic pressure, energy flux density, momentum flux density, the law of conservation of circulation, potential flow, drag force. |
| BK-3.38 | Viscous fluids | Viscous fluids: Navier-Stokes equations, energy dissipation and incompressible fluids, Stokes' force, flow of viscous fluids in pipes, Reynolds number. |
| BK-3.39 | Temperature and heat | Temperature and heat. |



| No/Code | Study Material (BK) | Description of Study Material |
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| BK-3.40 | Transport phenomena | Transport phenomena. |
| BK-3.41 | Thermodynamic systems | Thermodynamic systems, state variables (temperature, pressure, volume), phases and phase changes (solid, liquid and gas). |
| BK-3.42 | The zeroth law of thermodynamics | The zeroth law of thermodynamics. |
| BK-3.43 | Ideal gas | Ideal gas: equation of state, heat and heat capacity, specific heat, equation of state for real gases. |
| BK-3.44 | The first law of thermodynamics | The first law of thermodynamics. |
| BK-3.45 | The second law of thermodynamics: entropy, the principle of maximum entropy, the Carnot process | The second law of thermodynamics: entropy, the principle of maximum entropy, the Carnot process. |
| BK-3.46 | Entropy | Entropy and energy as thermodynamic potentials: Legendre transformation, energy, free energy, enthalpy. |
| BK-3.47 | Motion of a many-particle system | Motion of a many-particle system: linear momentum and angular momentum for the system, conservation of linear momentum and angular momentum, motion of the centre of mass, total force and total torque, kinetic energy of the system, centre-of-mass frame. Examples: rocket motion, collision theory, collision analysis using the centre-of-mass frame, two-body problems (scattering and bound systems). |
| BK-3.48 | Motion of rigid bodies | Motion of rigid bodies: 1) Pure rotation (rotation of a rigid body about a fixed axis): moment of inertia, kinetic energy, application of Newton's Second Law to rotational motion, law of conservation of angular momentum; 2) Combined motion (rotation and translation of a rigid body): angular momentum, kinetic energy, inertia tensor, law of conservation of angular momentum, examples of combined rotation: planar motion (e.g. rolling motion), gyroscopic motion (spinning top). |
| BK-3.49 | Non-inertial reference frames | Non-inertial reference frames: accelerated reference frames and inertial forces (apparent/fictitious forces), rotating reference frames (centrifugal acceleration and Coriolis acceleration), particle dynamics in rotating reference frames, effects of Earth's rotation (Foucault pendulum, trade winds, climate change). |
| BK-3.50 | Lagrange and Hamilton formulations | Lagrange's and Hamilton's formulations: constraints, general coordinate systems, Hamilton's principle and the Euler-Lagrange equations, Lagrange's function and the energy function, general momentum, Hamilton's equations and the momentum phase space. |
| BK-3.51 | Motion in a central force field | Motion in a central force field: Kepler's laws, the conic section equations in polar coordinates, central force and conservation of angular momentum, derivation of the equations of motion for a body in a central potential in polar coordinates, finding solutions to the equations of motion for the Keplerian potential ($-k/r$), potential energy of the gravitational field. |
| BK-3.52 | Linear vibration | Linear vibration: a body on a spring, simple harmonic motion, damped vibration, forced vibration, coupled vibration, superposition of vibrations. |
| BK-3.53 | Waves | Waves: plane waves, coherent waves, wave equations and their solutions, wave superposition (interference and diffraction), wave energetics, reflection and refraction, stationary waves, dispersion, mechanical waves: sound waves in solids, liquids and gases; spherical and cylindrical waves; introduction to electromagnetic waves; multidimensional waves; medium impedance; dispersion relations; propagation at medium boundaries; the Doppler effect. |
| BK-3.54 | Physical optics | Physical optics: Huygens' principle, interference (wavefront |



| No/Code | Study Material (BK) | Description of Study Material |
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| | | interferometer, amplitude interferometer), diffraction (Fresnel, Fraunhofer, single slit and diffraction grating), polarisation. |
| BK-3.55 | Geometric Optics | Geometric optics: Fermat's principle, reflection and refraction, optical instruments. |
| BK-3.56 | Propagation of light | Propagation of light within a medium and between media. |
| BK-3.57 | Coulomb's law | The basis of the Coulomb's law experiment, Coulomb's law. |
| BK-3.58 | Static electric field | Static electric field from a point charge, static electric field from discrete and continuous charge distributions, and electric dipoles; electric field lines and electric flux; Gauss's law. |
| BK-3.59 | Work and Potential Energy | Work and electric potential energy, electric potential, multipole expansion, Poisson's equation and Laplace's equation, boundary value problems. |
| BK-3.60 | Conductors, insulators, and semiconductors | Conductors, insulators, and semiconductors. |
| BK-3.61 | Capacitors | Capacitors, capacitance, and dielectric materials. |
| BK-3.62 | Electrostatics | Electrostatics in materials. |
| BK-3.63 | Electric current | Electric current and current density, the continuity equation. |
| BK-3.64 | Magnetic fields | Fundamentals of static magnetism experiments, magnetic induction, motion of charged particles in a magnetic field, the stationary magnetic field equation, vector potential, Faraday's law, magnetic dipoles, and the it generates. |
| BK-3.65 | Magnetism | Magnetism of materials, permeability, magnetisation, susceptibility. |
| BK-3.66 | Maxwell's Equations | Applications of Maxwell's equations, electromagnetic waves. |
| BK-3.67 | Maxwell's equations | Application of the covariant formulation of Maxwell's equations. |
| BK-3.68 | Wave Polarisation | Implementation of electromagnetic wave polarisation, the propagation of light within and between media, Fermat's principle, and the effects of media anisotropy. |
| BK-3.69 | Theory of relativity | Theory of relativity: definition of an inertial frame of reference, postulates of special relativity, Lorentz transformations, effects of special relativity: length contraction, time dilation, twin paradox, special relativity and electrodynamics, formulation of covariance. |
| BK-3.70 | History of quantum physics | Experimental background: blackbody radiation, the photoelectric effect, the Compton effect, electron diffraction (the Davisson-Germer experiment), pair production, wave-particle duality, de Broglie's hypothesis, Heisenberg's uncertainty principle, atomic and molecular models. |
| BK-3.71 | Schrödinger's equation | Wave mechanics: the Schrödinger equation, interpretation of the wave function, wave normalisation, eigenvalues, eigenfunctions, degeneracy, operators and expectation values. |
| BK-3.72 | Applications of the Schrödinger Equation | Solutions to the Schrödinger equation: free particle, step potential, potential well, tunneling effect, simple harmonic oscillator, hydrogen atom, angular momentum. |
| BK-3.73 | Physics Experiments | Experiments underlying the birth of modern physics: the Millikan drop, the photoelectric effect, the Frank-Hertz experiment, etc. |
| BK-3.74 | Structure and properties of the atomic nucleus | Structure and properties of the atomic nucleus: nuclear configuration, size and shape of the atomic nucleus, angular momentum and nuclear magnetic moment, nuclear forces (interactions between nucleons within the atomic nucleus), stability of the atomic nucleus, nuclear binding energy, Weizsäcker's semi-empirical formula. |
| BK-3.75 | Radioactivity | Radioactivity: fundamental quantities of radioactivity, chain decay, radioactive equilibrium, artificial radioactivity. |
| BK-3.76 | Types of nuclear radiation | Types of nuclear radiation: alpha decay, beta decay, gamma decay. |
| BK-3.77 | Nuclear reactions | Nuclear reactions: classification of nuclear reactions, mechanisms of nuclear reactions, kinetics of nuclear reactions, parameters of |



| No/Code | Study Material (BK) | Description of Study Material |
|---------|---|---|
| | | nuclear reactions. |
| BK-3.78 | Elementary particles | Elementary particles: lepton interactions, muons, hadrons, quarks. |
| BK-3.79 | Ideal gas kinetic theory | Kinetic theory of ideal gases, pressure, work, and chemical potential. |
| BK-3.80 | Maxwell's equations | Maxwell's equations, phase space, molecular statistics (Bose-Einstein, Fermi-Dirac, Maxwell-Boltzmann), distribution functions, statistical definition of entropy, ensemble theory and the microcanonical ensemble, the canonical ensemble. |
| BK-3.81 | Crystal structure | Crystal structure: symmetry and crystal structure, crystal lattice diffraction, atomic bonding in crystals. |
| BK-3.82 | Crystal lattice dynamics | Crystal lattice dynamics: vibrations in solids, heat capacity of solids, lattice vibrations. |
| BK-3.83 | Free-electron model | Free-electron model: classical free-electron model, quantised free-electron model, behaviour of electrons in metals, objections to the free-electron model. |
| BK-3.84 | Energy band theory | Energy band theory: energy band theory, the LCAO method, electron dynamics in metals. |
| BK-3.85 | Semiconductor Materials | Semiconductors: classification of semiconductors based on groups in the periodic table of elements, intrinsic and extrinsic semiconductors. |
| BK-3.86 | Dielectric materials | Dielectric materials: macroscopic and microscopic views, dielectric phenomena, and magnetic materials: magnetic susceptibility, magnetic phenomena. |
| BK-3.87 | Environmental Physics | Introducing relevant physics concepts within the context of the natural and human social environment. In this course, students will study various physical principles related to environmental phenomena, such as climate change, pollution, renewable energy sources, and energy conservation. |
| BK-3.88 | Introduction to Astronomy | Basic concepts of astronomy, including time systems (sidereal and solar), astronomical calendars, and measurement techniques such as magnitude, parallax, and spectroscopy to determine the physical properties of stars. The dynamics of celestial bodies through Kepler's laws and gravity, as well as exploring the structure and evolution of the universe through cosmological models and dark matter. |
| BK-3.89 | Biology | <ol style="list-style-type: none"> 1. The origins of life. 2. Physical and chemical phenomena. 3. Cells. 4. Plant structure and function. 5. Structure and function of animals. 6. Metabolism. 7. Plant and animal reproduction. 8. Biodiversity. 9. Genetics. 10. Ecology. |
| BK-3.90 | Chemistry | Atomic structure, the periodic table of elements, molecular structure, stoichiometry, solutions, chemical energetics, chemical kinetics, chemical equilibrium, nuclear chemistry, and carbon chemistry. |
| BK-10.1 | K3 Electronics | Concepts of conducive and safe working conditions in the electronics industry. |
| BK-10.2 | Electronics components and instrumentation | Concepts of electronic components and instrumentation devices. |
| BK-10.3 | PCB assembly and wiring system installation | Concepts of PCB assembly and installation of cabling systems and their mechanical components. |
| BK-10.4 | Diagnosis and repair of faults | Concepts of diagnosing faults and repairing faults in electronic |



| No/Code | Study Material (BK) | Description of Study Material |
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| | in electronic devices | devices using appropriate techniques. |
| BK-10.5 | Fabrication of electronic circuit prototypes using conventional methods and E-CAD | Concepts of fabricating electronic circuit prototypes using conventional methods and E-CAD software. |
| BK-10.6 | Designing embedded programming systems on microcontrollers and various interfaces | Concepts of embedded programming systems on microcontrollers with various input and output interfaces, both via wired and wireless media. |
| BK-1.15 | Mastery of educational disciplines | Curriculum development in accordance with the field of responsibility. |
| BK-1.16 | Teaching | Application of information and communication technology in lesson planning, delivery, assessment and management. |
| BK-1.17 | Learning | The application of information and communication technology in lesson planning. |
| BK-1.18 | Learning | Theories of learning and teaching, approaches and models of learning, teaching materials, and assessment for learning purposes. |
| BK-2.1 | Foundations of Education | Identifying and analysing educational issues and evaluating one's own or others' teaching practices based on principles of educational psychology and philosophy. |
| BK-2.2 | Student Development | Designing physics lessons with consideration for the developmental stages of learners. |
| BK-2.6 | 21st-century skills | Designing physics lessons that develop literacy, numeracy and higher-order thinking skills. |
| BK-2.7 | Basic teaching skills | Practising basic teaching skills and the management of physics learning (skills in opening and closing lessons, asking questions, explaining, providing reinforcement, introducing variety, managing the class, leading small-group discussions, and teaching small groups and individuals). |
| BK-2.8 | Physics lesson design | Designing innovative physics learning. |
| BK-2.16 | Assessment | Designing assessment tools appropriate to the learning objectives of physics. |
| BK-2.17 | Learning evaluation | Using software or digital platforms for learning evaluation. |
| BK-2.22 | Laboratory management | Utilising the school's physics laboratory for physics learning development activities by integrating technology and the environment. |
| BK-2.29 | Probability | Implementation of probability, sample space, calculation methods, random variables, continuous distributions, binomial distributions, normal (Gaussian) distributions, Poisson distributions. |
| BK-4.1 | Micro Lesson Plan (RPP) | <ol style="list-style-type: none"> 1. Development of lesson plans based on the latest curriculum. 2. Formulation of learning objectives using operational verbs (ABCD). 3. Selection of media, methods, and strategies. |
| BK-4.2 | Eight basic teaching skills | <ol style="list-style-type: none"> 1. Lesson-opening skills: creating motivation and learning orientation. 2. Questioning skills: low-level and high-level questions, waiting time. 3. Reinforcement skills: verbal and non-verbal. 4. Skills in introducing variety: variety of media, teaching styles, interaction patterns. 5. Explanation skills: clear and logical communication. 6. Skills in guiding small-group discussions: facilitating discussions and drawing conclusions. 7. Classroom management skills: time management, seating arrangements, and dealing with disruptions. 8. Skills in concluding a lesson: summarising, providing feedback, |



| No/Code | Study Material (BK) | Description of Study Material |
|---------|---|---|
| | | and motivating. |
| BK-4.3 | Application of learning media and technology | 1. Use of digital media (<i>PowerPoint</i> , video, simulations). 2. Utilisation of LMS and collaboration tools (Google Classroom, Padlet, Kahoot). |
| BK-4.4 | Teaching simulation practice (microteaching) | 1. Conducting teaching practice sessions lasting 25–30 minutes. 2. Observation by peers and lecturers. 3. Analysis of video recordings of teaching practice. |
| BK-4.5 | Learning evaluation and reflection | 1. Micro-teaching assessment techniques. 2. Providing <i>feedback</i> and self-reflection. |
| BK-3.1 | Functions | Plotting graphs of various types of functions. |
| BK-3.2 | Limit | Applying the concept of limits to solve physics problems. |
| BK-3.3 | Derivatives | Application of the concept of derivatives in solving physics problems. |
| BK-3.4 | Integrals | Application of the concept of integration in solving physics problems. |
| BK-3.5 | Matrix operations | Application of matrix operations in solving physics problems. |
| BK-3.6 | Complex numbers | Application of complex number concepts in solving physics problems. |
| BK-3.7 | Series | Application of series concepts in solving physics problems. |
| BK-3.8 | Algebra and complex functions | Application of algebraic concepts and complex functions in solving physics problems. |
| BK-3.9 | Ordinary differential equations | Application of ordinary differential equations in solving physics problems. |
| BK-3.10 | Partial differential equations | Application of partial differential equations in solving physics problems. |
| BK-3.11 | Integral transforms | Application of the concept of integral transforms in solving physics problems. |
| BK-3.12 | Systems of linear equations | Application of the concept of systems of linear equations in solving physics problems. |
| BK-3.13 | Variational Calculus | Application of the concepts of the calculus of variations in solving physics problems. |
| BK-3.14 | Computer programming | Using programming to solve problems. |
| BK-3.15 | Introduction to numerical methods | Using numerical methods to solve problems. |
| BK-3.16 | DC circuits | Implementation of DC circuits, current sources and voltage sources. |
| BK-3.17 | Thevenin's and Norton's Theorems | Implementation of Thevenin's Equivalent Circuit, Norton's Equivalent Circuit. |
| BK-3.18 | AC circuits | Implementation of AC circuits. |
| BK-3.19 | Semiconductors | Implementation of semiconductors, PN junctions, diodes, waveform rectifiers, DC power supplies, Zener diodes, bipolar transistors, transistor characteristics, AC and DC load lines, transistors as small-signal amplifiers, transistor switches. |
| BK-3.20 | Testing the performance of analogue electronics | Ability to measure the performance of analogue electronics. |
| BK-3.21 | Electrical measurement instruments | Able to use electrical measurement instruments. |
| BK-3.23 | Sensor devices | Applications of input devices: sensors; types of sensors: temperature sensors, mechanical quantity sensors, optical sensors, magnetic sensors, and other sensors. |
| BK-3.24 | Testing the performance of digital electronics | Able to measure the performance of digital electronics. |
| BK-3.28 | Newton's concept of space-time | Application of the concepts of space and time (Newtonian and Galilean concepts of space-time). |
| BK-3.29 | Fundamental quantities of motion | Application of basic quantities of motion: reference frame, position, displacement, distance travelled (path length), speed (average and |



| No/Code | Study Material (BK) | Description of Study Material |
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| | | instantaneous), linear velocity (average and instantaneous), linear acceleration (average and instantaneous), angular velocity (average and instantaneous), and angular acceleration (average and instantaneous). |
| BK-3.30 | Types of motion | Applications of types of motion: motion in a straight line, motion in a plane, motion in space, relative motion (relative position and velocity). |
| BK-3.31 | Analysis of particle motion | Applications of particle motion in curved coordinates (polar, spherical, cylindrical). |
| BK-3.32 | Newton's Laws | Applications of Newton's laws of motion: Newton's laws of motion, inertial reference frames, inertial mass and gravitational mass, force and momentum, torque and angular momentum (relative to the coordinate centre and other points), and Newton's laws for rotational motion. |
| BK-3.33 | Application of Newton's Laws | Applications of Newton's laws of motion: equilibrium of a point mass, time-dependent forces (e.g. impulse), position-dependent forces (e.g. restoring force, gravitational force), velocity-dependent forces (e.g. Stokes' force, drag force), and their combinations (e.g. spring force and friction). |
| BK-3.34 | Work and energy | Application of the concepts of work and energy, the work-kinetic energy theorem, conservative forces and potential energy, the law of conservation of energy, and their applications. |
| BK-3.35 | Gravity | Application of Newton's laws of gravity: gravity in systems of point masses and continuous bodies, gravitational potential energy. |
| BK-3.36 | Fluid concepts | Application of fluid concepts, Eulerian and Lagrangian descriptions, the concept of particles in a fluid, flow lines, path lines, and streamlines, the continuity equation for incompressible fluids. |
| BK-3.37 | Ideal fluids | Applications of ideal fluids: Euler's equations, Bernoulli's equation, hydrostatic pressure, energy flux density, momentum flux density, the law of conservation of circulation, potential flow, drag force. |
| BK-3.38 | Viscous fluids | Applications of viscous fluids: Navier-Stokes equations, energy dissipation and incompressible fluids, Stokes' force, viscous fluid flow in pipes, Reynolds number. |
| BK-3.39 | Temperature and heat | Application of the concepts of temperature and heat in everyday life and industry. |
| BK-3.40 | Transport phenomena | Application of transport phenomena. |
| BK-3.41 | Thermodynamic systems | Application of thermodynamic systems, state variables (temperature, pressure, volume), phases and phase changes (solid, liquid and gas). |
| BK-3.42 | The zeroth law of thermodynamics | Applications of the zeroth law of thermodynamics. |
| BK-3.43 | Ideal gas | Application of the concept of an ideal gas. |
| BK-3.44 | The First Law of Thermodynamics | Application of the first law of thermodynamics. |
| BK-3.45 | The second law of thermodynamics: entropy, the entropy principle maximum, Carnot cycle | Application of the second law of thermodynamics: entropy, the principle of maximum entropy, the Carnot process. |
| BK-3.46 | Entropy | Application of the concepts of entropy and energy as thermodynamic potentials: Legendre transformation, energy, free energy, enthalpy. |
| BK-3.47 | Motion of a system of many particles | Application of the motion of a many-particle system: linear momentum and angular momentum for the system, conservation of linear momentum and angular momentum, centre-of-mass motion, total force and total torque, kinetic energy of the system, centre-of-mass frame. Examples: rocket motion, collision theory, collision |



| No/Code | Study Material (BK) | Description of Study Material |
|---------|--|---|
| | | analysis using the centre-of-mass frame, two-body problems (scattering and bound systems). |
| BK-3.48 | Motion of rigid bodies | Implementation of rigid body motion: 1) Pure rotation (rotation of a rigid body about a fixed axis): moment of inertia, kinetic energy, application of Newton's Second Law to rotational motion, law of conservation of angular momentum; 2) Combined motion (rotation and translation of a rigid body): angular momentum, kinetic energy, inertia tensor, law of conservation of angular momentum, examples of combined rotation: planar motion (e.g. rolling motion), gyroscopic motion (spinning top). |
| BK-3.49 | Non-inertial reference frames | Applications of the concept of non-inertial reference frames: accelerated reference frames and inertial forces. |
| BK-3.50 | Lagrange and Hamilton formulations | Applications of the Lagrangian and Hamiltonian formulations: constraints, general coordinate systems, Hamilton's principle and the Euler-Lagrange equations, the Lagrangian and energy functions, general momentum, the Hamiltonian equation and the momentum phase space. |
| BK-3.51 | Motion in a central force field | Applications of motion in a central force field: Kepler's laws, the conic section equations in polar coordinates, central force and conservation of angular momentum, derivation of the equations of motion for a body in a central potential in polar coordinates, finding solutions to the equations of motion for the Keplerian potential ($-k/r$), potential energy of the gravitational field. |
| BK-3.52 | Linear oscillations | Applications of linear vibration: a body on a spring, simple harmonic motion, damped vibration, forced vibration, coupled vibration, superposition of vibrations. |
| BK-3.53 | Waves | Applications of waves: plane waves, coherent waves, wave equations and their solutions, wave superposition (interference and diffraction), wave energetics, reflection and refraction, stationary waves, dispersion, mechanical waves: sound waves in solids, liquids and gases, spherical and cylindrical waves, introduction to electromagnetic waves, multidimensional waves, medium impedance, dispersion relations, propagation at medium boundaries, the Doppler effect. |
| BK-3.54 | Physical optics | Applications of physical optics: Huygens' principle, interference (wavefront interferometer, amplitude interferometer), diffraction (Fresnel, Fraunhofer, single slit and diffraction grating), polarisation. |
| BK-3.55 | Geometric Optics | Applications of geometric optics: Fermat's principle, reflection and refraction, optical instruments. |
| BK-3.56 | Propagation of light | Implementation of light propagation within a medium and between media. |
| BK-3.57 | Coulomb's law | Basic experimental application of Coulomb's law, Coulomb's law. |
| BK-3.58 | Static electric field | Application of static electric fields to point particles, static electric fields from discrete and continuous charge distributions, and electric dipoles; electric field lines and electric flux; Gauss's Law. |
| BK-3.59 | Work and potential energy | Applications of work and electric potential energy, electric potential, multipole expansion, Poisson's equation and Laplace's equation, boundary value problems. |
| BK-3.60 | Conductors, insulators, and semiconductors | Implementation of conductors, insulators, and semiconductors. |
| BK-3.61 | Capacitors | Applications of capacitors, capacitance, and dielectric materials. |
| BK-3.62 | Electrostatics | Applications of electrostatics in materials. |
| BK-3.63 | Electric current | Implementation of wave concepts: plane waves, harmonic waves, wave equations and their solutions, superposition (interference and diffraction), wave energetics |

| No/Code | Study Material (BK) | Description of Study Material |
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| | | of waves, reflection and refraction, standing waves, dispersion, mechanical waves: sound waves in solids, liquids and gases; spherical and cylindrical waves; introduction to electromagnetic waves, , medium impedance, dispersion relation, propagation at medium boundaries, the Doppler effect. |
| BK-3.64 | Magnetic fields | Applications of static magnets, magnetic , motion of charged particles in a , equations for stationary magnetic fields, , Faraday's law, magnetic dipoles, and the resulting it generates. |
| BK-3.65 | Magnetism | Applications of magnetism in materials, permeability, magnetisation, susceptibility. |
| BK-3.66 | Maxwell's Equations | Applications of Maxwell's equations, electromagnetic waves. |
| BK-3.67 | Maxwell's equations | Implementation of the covariant formulation of Maxwell's equations. |
| BK-3.68 | Wave polarisation | The application of electromagnetic wave polarisation, the propagation of light within and between media, Fermat's principle, and the effects of media anisotropy. |
| BK-3.69 | Theory of relativity | Applications of the theory of relativity: the concept of an inertial frame of reference, the postulates of special relativity, the Lorentz transformation, and the effects of special relativity: length contraction, time dilation, the twin paradox, special relativity and electrodynamics, and the formulation of covariance. |
| BK-3.70 | History of quantum physics | Implementation of the concepts of static magnetism, magnetic induction, motion of charged particles in a magnetic field, the equations of a stationary magnetic field, vector potential, Faraday's law, magnetic dipoles, and the fields they generate. |
| BK-3.71 | Schrödinger Equation | Implementation of wave mechanics: the Schrödinger equation, interpretation of the wave function, wave normalisation, eigenvalues, eigenfunctions, degeneracy, operators and expectation values. |
| BK-3.72 | Applications of the Schrödinger Equation | Applications of the Schrödinger equation: free particles, step potential, potential well, tunneling effect, simple harmonic oscillator, hydrogen atom, angular momentum. |
| BK-3.73 | Physics experiments | Conducting experiments that underpin the birth of modern physics: the Millikan drop, the photoelectric effect, the Frank-Hertz experiment, etc. |
| BK-3.74 | Structure and properties of the atomic nucleus | Implementation of the structure and properties of the atomic nucleus: nuclear configuration, size and shape of the atomic nucleus, angular momentum and nuclear magnetic moment, nuclear forces (interactions between nucleons within the atomic nucleus), stability of the atomic nucleus, nuclear binding energy, Weiszacker's semi-empirical formula. |
| BK-3.75 | Radioactivity | Implementation of radioactivity: fundamental quantities of radioactivity, chain decay, radioactive equilibrium, artificial radioactivity. |
| BK-3.76 | Types of nuclear radiation | Implementation of various types of nuclear radiation: alpha decay, beta decay, gamma decay. |
| BK-3.77 | Nuclear reactions | Applications of nuclear reactions. |
| BK-3.78 | Elementary particles | Implementation of the concept of elementary particles: lepton, muon, hadron and quark interactions. |
| BK-3.79 | Ideal gas kinetic theory | Application of the kinetic theory of ideal gases, pressure, work, and chemical potential. |
| BK-3.80 | <i>Maxwell's equations</i> | Application of the concepts of Maxwell's Equations, phase space, molecular statistics (<i>Bose-Einstein, Fermi-Dirac, Maxwell-</i> |



| No/Code | Study Material (BK) | Description of Study Material |
|---------|--|--|
| | | <i>Boltzmann</i>), distribution functions, statistical definition of entropy, ensemble theory and the microcanonical ensemble, the canonical ensemble. |
| BK-3.81 | Crystal structure | Implementation of crystal structure: symmetry and crystal structure, crystal lattice diffraction, atomic bonding in crystals. |
| BK-3.82 | Crystal lattice dynamics | Implementation of crystal lattice dynamics: vibrations in solids, heat capacity of solids, lattice vibrations. |
| BK-3.83 | Free-electron model | Implementation of the free-electron model: classical free-electron model, quantised free-electron model, behaviour of electrons in metals, objections to the free-electron model. |
| BK-3.84 | Energy band theory | Applications of energy band theory: energy band theory, the LCAO method, electron dynamics in metals. |
| BK-3.85 | Semiconductor materials | Applications of semiconductor materials. |
| BK-3.86 | Dielectric materials | Applications of dielectric materials: macroscopic and microscopic perspectives, dielectric phenomena, and magnetic materials: magnetic susceptibility, magnetic phenomena. |
| BK-3.87 | Environmental physics | Applying knowledge of environmental physics to solve problems. |
| BK-3.88 | Introduction to Astronomy | Using knowledge of astrophysics to solve problems. |
| BK-3.89 | Biology | Applying concepts of the origin of life, physical and chemical phenomena, cells, plant structure and function, animal structure and function, metabolism, plant and animal reproduction, biodiversity, genetics, and ecology to analyse the relationship between the structure and function of living organisms, as well as their interaction with the environment in maintaining ecosystem balance. |
| BK-3.90 | Chemistry | Applying concepts of atomic structure, the periodic table, molecular structure, stoichiometry, solutions, chemical energetics, chemical kinetics, chemical equilibrium, nuclear chemistry, and carbon chemistry to analyse the properties, reactivity, and changes in matter in various contexts of life and the environment. |
| BK-6.1 | Drafting a research proposal | Drafting a research proposal in physics education based on the results of problem identification using appropriate research methods. |
| BK-6.2 | Conducting physics research in physics education | Conducting physics education research based on the research proposal and presenting it orally in an examination forum in accordance with scientific principles, procedures and ethics. |
| BK-6.3 | Writing research results | Writing research results in the form of a dissertation or final project report and publishing them as a scientific article, which must be uploaded to the university's website, prioritising originality to prevent plagiarism. |
| BK-6.4 | The publication process | Scientific publication processes and techniques: journal selection, structuring scientific articles, writing research findings, drafting abstracts, citation and reference lists. The peer review process and publication ethics. |
| BK-1.15 | Mastery of the field of educational science | Curriculum management at the school level. |
| BK-1.16 | Learning | Development of a learning environment that is safe, comfortable, enjoyable, challenging, and fosters creativity in learners. |
| BK-1.17 | Subject-specific knowledge | The scope of subject-specific content within the study programme. |
| BK-1.18 | Learning | Development of a learning environment that is safe, comfortable, enjoyable, challenging, and fosters students' creativity. |
| BK-2.3 | Revised Bloom's Taxonomy | Developing learning outcome indicators and determining appropriate assessment techniques. |
| BK-2.4 | Philosophy of Physics | Evaluating physical theories from a philosophical perspective, constructing scientific arguments, and reflecting on epistemological issues in physics education. Evaluating students' thinking, examining cases of scientific ethics rationally, and practising the |



| No/Code | Study Material (BK) | Description of Study Material |
|---------|---|--|
| | | communication of philosophical ideas through academic discussions and presentations. |
| BK-2.5 | 21st-century skills | Developing project-based or problem-solving learning strategies. |
| BK-2.7 | Physics lesson design | Making decisions on selecting the best methods for teaching specific concepts. |
| BK-2.9 | English for physics instruction | Designing and delivering physics lessons in English in accordance with international school curriculum standards (e.g. Cambridge IGCSE, IB, or the National Plus Curriculum). |
| BK-2.11 | Development of teaching materials and learning resources | Comparing several alternatives for learning media and determining the best choice. |
| BK-2.13 | Physics curriculum for Year 10 secondary school | Drawing up annual and termly programmes and aligning lesson plans with the physics curriculum for Year 10 in secondary schools. |
| BK-2.14 | Physics curriculum for Year 11 | Developing annual and semester programmes and aligning lesson plans with the physics curriculum for Year 11 in secondary schools. |
| BK-2.16 | Assessment aspects | Developing valid and reliable test items (cognitive, psychomotor, affective). |
| BK-2.17 | Computer-assisted assessment of literacy, numeracy and higher-order thinking skills | Managing and interpreting evaluation data for decision-making regarding learning. |
| BK-2.18 | Item analysis | Conducting item quality analysis: validity, reliability, discriminative power, and difficulty level. |
| BK-2.19 | The nature of research | Writing the problem background based on data regarding physics learning problems in schools to identify alternative solutions in the research. |
| BK-2.20 | Identifying the problem | Determining theories of physics learning to serve as the theoretical framework for the research. |
| BK-2.21 | Physics education research methods | Selecting a research approach relevant to the problems encountered in the classroom. |
| BK-2.24 | Critical analysis of articles | Critical analysis of scientific articles in the field of physics education. Constructing arguments based on research findings for publication. |
| BK-1.14 | Community empowerment | Implementation of national awareness, the philosophy of Community Service (KKN), community potential and issues, work programme planning, group dynamics, the community's socio-cultural system, multi-stakeholder collaboration in programme implementation, and the role of students in KKN. |
| BK-2.1 | Student Development | Using the concept of student development to complete tasks responsibly. |
| BK-2.4 | Philosophy of physics | Using concepts of the philosophy of science to complete tasks responsibly. |
| BK-2.5 | 21st-century skills | Using 21st-century skills to complete tasks responsibly. |
| BK-2.6 | Basic teaching skills | Using the concepts of basic teaching skills to complete tasks responsibly. |
| BK-2.7 | Physics lesson design | Using physics learning design concepts to complete tasks responsibly. |
| BK-2.9 | <i>English for physics instruction</i> | Using concepts of <i>English for physics instruction</i> to complete tasks responsibly. |
| BK-2.10 | Development of teaching materials and learning media | Using the concept of the development of teaching materials and learning media to complete tasks responsibly. |
| BK-2.12 | The physics curriculum in Year 10 secondary school | Using the concept of the physics curriculum in Year 10 secondary school to complete tasks responsibly. |
| BK-2.13 | The physics curriculum in Year 11 of secondary school | Using the concepts of the Grade 11 secondary school physics curriculum to complete tasks responsibly. |
| BK-2.14 | <i>Assessment as, for and of learning</i> | Using the concept of student development to complete tasks responsibly. |



| No/Code | Study Material (BK) | Description of Study Material |
|---------|--|--|
| BK-2.17 | Item analysis | Using concepts of the evaluation of learning processes and outcomes to complete tasks responsibly. |
| BK-2.21 | Research methods in physics education | Using research methodology concepts to complete tasks responsibly. |
| BK-2.23 | Laboratory management | Using concepts of learner development to complete tasks responsibly. |
| BK-2.25 | Principles of scientific writing | Using concepts of learner development to complete tasks responsibly. |
| BK-4.4 | Teaching simulation practice (microteaching) | Able to conduct teaching simulations with a sense of responsibility. |
| BK-2.11 | Development of teaching materials and learning media | The process of creating or selecting tools and materials to be used in the learning process to help learners understand and master the subject matter. |
| BK-9.1 | Creative multimedia research | The process of exploration and investigation used to generate new ideas, innovations, and creative solutions in the fields of design, production, and distribution of multimedia content. |
| BK-9.2 | Multimedia project proposal | The process of preparing a written document detailing the plan, objectives, and implementation of a multimedia project. |
| BK-9.3 | Visual direction (<i>storyline</i>) | Understanding the visual direction, then breaking it down into smaller, more specific components, and finally designing a process that enables these components to be realised. |
| BK-9.4 | Visual assets (graphic design, animation, motion graphics) | Understanding of project requirements, use of appropriate software, and mastery of visual techniques to produce high-quality results. |
| BK-9.5 | Integration of all multimedia components related to audio and visuals | The process of combining elements such as text, images, audio, video, and animation into a coherent and engaging experience. |
| BK-10.1 | Electronics Health and Safety | Maintaining conducive and safe working conditions in the electronics industry. |
| BK-10.2 | Electronics components and instrumentation | Identifying electronic components and instrumentation devices. |
| BK-10.3 | PCB assembly and wiring system installation | Performing PCB assembly and the installation of cabling systems and their mechanical components. |
| BK-10.4 | Diagnosing and repairing faults in electronic devices | Diagnosing faults and repairing faults in electronic devices using appropriate techniques. |
| BK-10.5 | Fabricating prototypes of electronic circuits using conventional methods and E-CAD | Designing, creating and fabricating prototypes of electronic circuits using both conventional methods and E-CAD software. |
| BK-10.6 | Designing embedded programming systems on microcontrollers and various interfaces | Designing embedded programming systems on microcontrollers with various input and output interfaces, both via wired and wireless media. |
| BK-1.1 | Islam in ensuring happiness in this world and the hereafter, in the context of modern life | Explaining the principles of Islam in building a balanced life between worldly and spiritual needs. |
| BK-1.2 | Christianity | <ol style="list-style-type: none"> 1. God the Creator: Creating, saving and accompanying. 2. Human beings, God's creation: Created in the image and likeness of the Creator. 3. Christian Ethics, Morals and Character: Opposed to sexual abuse. 4. Human Rights and Responsibilities. 5. Faith, Knowledge and Service. 6. Christianity and Culture. 7. Interfaith Harmony: Building Tolerance. 8. Diversity as a Reality. 9. Human Rights: Humanising Humanity: Anti-Bullying. 10. Democracy. |



| No/Code | Study Material (BK) | Description of Study Material |
|---------|---------------------|--|
| | | 11. Work as a Mandate from God: Anti-Corruption. 12. The Relationship between Religion and the State according to Christianity. 13. The Law of Love: The foundation of Christian life in all aspects of life. |
| BK-1.3 | Catholicism | 1. Who is man according to the Bible? 2. Reasoning, exploring arguments, understanding and the nature of humanity as the image of God. 3. Communicating the calling and mission of humanity as the image of God. 4. Exploring the relationship of human beings with themselves, others, the environment and God. 5. Communicating humanity's relationship with oneself, others, the environment and God. 6. Religion as the completion of the understanding of the macrocosm and microcosm. 7. The lived experience of religious life within the Catholic Church. 8. The meaning of religious pluralism. 9. Interfaith cooperation for the sake of integral human development. 10. A personal introduction to Jesus in the Bible. 11. The meaning of the Passion, death and resurrection of Jesus Christ. 12. The Meaning of the Trinity. 13. The nature and mission of the Catholic Church for the preservation of life. 14. Living out the faith in a pluralistic society. 15. Faith for the creation of Pancasila-based builders. |
| BK-1.4 | Hinduism | 1. Study of the concept of sādḍha in the suttas (e.g. Sāleyyaka Sutta, Kalama Sutta), the typology of saddhā (buttika, ākāra, bala), the function of saddhā in the spiritual life of Buddhists, and the strengthening of faith through practice. 2. Contemporary issues such as secularism, spiritual crisis, and pluralism; the Buddhist approach to the concept of Divinity (without a creator), the relevance of nibbāna and brahmavihāra in addressing current spiritual needs. 3. Buddhist perspectives on anattā, dukkha, paṭiccasamuppāda, and nibbāna; the dignity of human beings as moral beings with the potential for enlightenment; the relevance of these teachings in addressing the questions of modern life. 4. Teachings on dāna, sīla, karuṇā, mettā, and samacariya; the role of the Buddhist community in social, economic, and educational development; Buddhist contributions to national values and public cooperation. 5. A historical study of the role of Buddhists in the state; the principles of pañca-sīla and dasavidha-rājadhamma; the contribution of Buddhist values in fostering social justice, the rule of law, and a culture of compassion. 6. The ethics of dāna as the basis for public contribution; the teaching of lokasangraha (the preservation of the world); tax awareness as a form of secular dāna; the value of nationalism in Indonesian Buddhism. 7. Teachings on gender equality in the suttas (e.g. Therīgāthā, Sutta Nipāta); the principle of non-violence (ahiṃsā); lay participation in social movements and the strengthening of democracy based on Buddhist values. 8. Suttas on tolerance and dialogue (e.g. Kalama Sutta, Cūḷekasāla |



| No/Code | Study Material (BK) | Description of Study Material |
|---------|---------------------|--|
| | | <p>Sutta); the history of Buddhist pluralism in India and Southeast Asia; the concept of majjhima paṭipadā as the basis for religious moderation.</p> <p>9. Interfaith education strategies; interfaith dialogue forums based on mettā-karuṇā; case studies of religious pluralism; legal analysis of religious freedom in the context of Indonesia and Buddhism.</p> |
| BK-1.5 | Buddhism | <p>1. Study of the concept of śraddhā in the Vedas, Upaniṣads, and Bhagavad Gītā; typology of faith (trividha śraddhā in Gītā 17:2–3); the function of śraddhā in the spiritual growth of Hindus; strengthening of faith through the practice of yajña, tapa, and dharma.</p> <p>2. Contemporary issues such as materialism, secularism, and popular spirituality; the Hindu approach to immanent-transcendent Divinity (Brahman and Īśvara); the relevance of mokṣa, ātman, and bhakti yoga in addressing modern spiritual needs.</p> <p>3. The Hindu view of ātman, saṁsāra, karma, and mokṣa; the dignity of humanity as dharmic beings capable of attaining the highest consciousness; the relevance of these teachings in addressing the modern search for the meaning of life.</p> <p>4. The teachings of dāna, seva, ahimsa, and kṣānti; the role of Hindus in social development and education; tangible contributions to economic development and national values in the spirit of dharma yuddha.</p> <p>5. A historical study of the role of Hindus in the states and kingdoms of the Nusantara; the principles of pañca yadnya and rājadharmā in state governance; the contribution of Hindu values to the ethics of governance, law, and the culture of the Nusantara.</p> <p>6. The ethics of dāna and yajña as forms of social responsibility; the concept of lokasaṁgraha in the Bhagavad Gītā (3:20–25); tax awareness as seva for the state; the value of patriotism in the practice of karma yoga among Indonesian Hindus.</p> <p>7. Teachings on gender equality in the Vedas and the Mahābhārata (e.g. the stories of Sulabhā and Draupadī); the principle of non-violence (ahiṁsā) in social relations; the contribution of Hindus to social movements and dharma-based democracy.</p> <p>8. Teachings on tolerance in the Vedas: ekaṁ sat viprā bahudhā vadanti; interfaith dialogue in the Upaniṣads and the Gītā; the history of Hindu pluralism in India and the Archipelago; the principles of madhyama mārga and sarva dharma sambhava in the practice of religious moderation.</p> <p>9. Strategies for interfaith education and dharmic dialogue; forums for harmony based on the values of ṛta and satya; case studies of Hindu tolerance in Bali and Java; analysis of religious freedom according to the 1945 Constitution and the inclusive stance of Hindu teachings."</p> |
| BK-1.6 | Confucianism | <p>1. Study of the concept of xin (faith) in the Analects, the Doctrine of the Mean, and the Mencius; typology of xin in relation to zhong, shu, and cheng (sincerity); the function of faith in the moral and spiritual lives of the faithful; strengthening of faith through the daily practices of li and xiu shen.</p> <p>2. Contemporary issues such as hedonism, the ethical crisis, and secularism; the Confucian view of Tian (Heaven) as the source of moral order; the relevance of dao, ren, and ming in addressing the spiritual void of the modern age.</p> <p>3. The Confucian view of human nature (xing) as inherently good; the value of the junzi as humanity's noble potential; the interconnection between moral cultivation (xiu shen) and social</p> |



| No/Code | Study Material (BK) | Description of Study Material |
|---------|---|---|
| | | <p>harmony; the application of these teachings to address contemporary existential questions.</p> <p>4. The teachings of ren, yi, li, zhong, shu, and xin in social life; moral obligations towards family and state; the tangible contributions of Confucians in the social, educational, and national spheres; the practices of gong (co-operation) and xiao (filial piety) in fostering harmony.</p> <p>5. Historical study of the role of Confucian communities within the state; moral practices based on da xue (great learning) and zhong yong (balance); the contribution of the value of he (harmony) in realising a compassionate legal system and social culture.</p> <p>6. The concept of li as a civil order and public ethics; the value of dāna in its social form through gong de (collective virtue); taxation as a civic duty to ensure national harmony; patriotism as an expression of zhong (loyalty) to the state.</p> <p>7. The doctrine of equality in classical Confucianism (e.g., Ren applies universally); the spirit of non-violence and wen (civilisation); the role of Confucian figures in education and social reform; the contribution of the faithful in strengthening democratic values.</p> <p>8. The attitude of tolerance in the Zhong Yong and Lun Yu; the principle of he er bu tong (harmony without uniformity); the history of Confucian pluralism in East Asia and Southeast Asia; the practice of zhong-shu as the basis for interfaith dialogue and religious moderation.</p> <p>9. Interfaith education strategies based on the values of Ren and Yi; the development of interfaith and humanitarian forums; case studies of the role of Confucian figures in religious harmony; analysis of the constitution and guarantees of religious freedom within the context of Confucian values.</p> |
| BK-1.7 | Pancasila Education | <ol style="list-style-type: none"> 1. The history and objectives of Pancasila Education. 2. Pancasila as the national identity. 3. Pancasila in the context of the 1945 Constitution. 4. Pancasila as the foundation of the state. 5. Pancasila as the ideology of the nation and state. 6. Pancasila as a philosophical system. 7. Pancasila and state policy. 8. Pancasila as an ethical system. |
| BK-1.8 | Civic Education | <ol style="list-style-type: none"> 1. The dynamics of democracy in Indonesia. 2. Law enforcement in Indonesia. |
| BK-1.9 | Indonesian Language | <ol style="list-style-type: none"> 1. Indonesian Spelling. 2. Indonesian Sentences. 3. Indonesian Paragraphs. 4. Compiling a Bibliography. 5. Citation Writing. 6. Writing Academic Papers. |
| BK-1.10 | PGRI Studies | <ol style="list-style-type: none"> 1. History and Dynamics of PGRI. 2. The Nature and Identity of PGRI. |
| BK-1.11 | English | <ol style="list-style-type: none"> 1. <i>Simple Present Tense.</i> 2. <i>Present Continuous Tense.</i> 3. <i>Simple Past Tense.</i> 4. <i>Present Perfect Tense.</i> 5. <i>Simple Future Tense.</i> |
| BK-1.12 | <ol style="list-style-type: none"> 1. <i>Design thinking</i> 2. <i>Business Model Canvas</i> 3. <i>Prototyping</i> | <ol style="list-style-type: none"> 1. <i>Design thinking, mentoring, exhibition & investor pitching.</i> 2. <i>Business Model Canvas, presentation and review of the Business Model Canvas.</i> |



| No/Code | Study Material (BK) | Description of Study Material |
|---------|---|--|
| BK-1.13 | <ol style="list-style-type: none">1. <i>Marketing Plan and Channels</i>2. <i>Planning and Strategising</i>3. <i>Unit Product Cost & Pricing Method</i>4. <i>Business Planning & Feasibility Study</i>5. <i>Intention to become an entrepreneur</i>6. <i>Communication & Negotiation Skills</i> | <p>3. <i>Prototyping.</i></p> <ol style="list-style-type: none">1. <i>Marketing management:</i> STP, marketing mix, and SWOT analysis. <i>Marketing management:</i> digital marketing, branding.2. <i>Human Resources & Operational Management:</i> job analysis and supply chain.3. <i>Financial management:</i> financial projections & working capital requirements.4. <i>Business plan</i> preparation & business feasibility testing.5. Visits to SME partners.6. <i>Business communication & analysis of startup funding needs.</i> |
| BK-1.14 | Community empowerment | Implementation of national awareness, the philosophy of Community Service Programmes (KKN), community potential and issues, work programme planning, group dynamics, the community's socio-cultural system, multi-stakeholder collaboration in programme implementation, and the role of students in KKN. |



6. Course Development and Determination of Credit Weight

Table 6.1 Matrix of PLO alignment with course content

| PLO | Study Materials |
|---|--|
| <p>PLO 1. Able to demonstrate character and manners that reflect adaptability, enthusiasm and integrity as a manifestation of piety towards God Almighty.</p> | <p>BK 1.1 Islam Religious Education BK 1.2 Christian Religious Education BK 1.3 Catholic Religious Education BK 1.4 Buddhist Religious Education BK 1.5 Hindu Religious Education BK 1.6 Confucian Religious Education BK 1.7 Pancasila Education BK 1.8 Civics Education BK 1.9</p> <ol style="list-style-type: none"> 1. The nature of Indonesian as the language of unity and the national language; 2. Exploring texts in academic life (instilling values and the nature of the Indonesian language as a vehicle for knowledge); 3. Exploring the world of libraries; 4. Designing research proposals and activity proposals; 5. Reporting research findings and the results of activities; and 6. Expressing oneself in academic articles. <p>BK 1.10 PGRI Studies BK 1.11</p> <ol style="list-style-type: none"> 1. Simple Present Tense 2. Present Continuous Tense 3. Simple Past Tense 4. Present Perfect Tense 5. Simple Future Tense <p>BK 1.12</p> <ol style="list-style-type: none"> 1. Design thinking 2. Business Model Canvas 3. Prototyping <p>BK 1.13</p> <ol style="list-style-type: none"> 1. Marketing Plan and Channels 2. Planning and Strategising 3. Unit Product Cost & Pricing Method 4. Business Planning & Feasibility Study 6. Intention to Become an Entrepreneur 7. Communication & Negotiation Skills <p>BK 1.14 Community Empowerment BK 1.15</p> <ol style="list-style-type: none"> 1. Mastery of educational disciplines 2. Knowledge of the academic field of the study programme 3. Understanding of learners <p>BK 1.16 Teaching BK 1.17</p> |



| PLO | Study Materials |
|---|---|
| | 1. Learning 2. Knowledge of the field of physics BK 1.18 1. Learners' Understanding 3. Learning 4. Mastery of educational science 5. Knowledge of the academic discipline of the study programme BK 1.19 Academic ethics in scientific publications BK 1.20 Professional Ethics for Teachers |
| PLO 2. Understanding educational theory and learner development, research methodology in physics education, physics laboratory management, as well as the principles, methods, and techniques of contextual physics learning utilising ICT. | BK 2.1 Foundations of Education BK 2.2 Student Development BK 2.3 Learning Theories and Physics Instruction BK 2.4 Revised Bloom's Taxonomy BK 2.5 Philosophy of Physics BK 2.6 21st-Century Skills BK 2.7 Basic teaching skills BK 2.8 Physics Instructional Design BK 2.9 English for Physics Instruction BK 2.10 Academic Writing for Physics Education Research BK 2.11 Development of teaching materials and learning media BK 2.12 Video, Animation and Graphic Design BK 2.13 Physics Curriculum for Year 10 in Secondary Schools BK 2.14 Physics curriculum in Year 11 of secondary school BK 2.15 Assessment as, for and of learning BK 2.16 Aspects of assessment BK 2.17 Computer-assisted assessment of literacy, numeracy and higher-order thinking skills BK 2.18 Item analysis BK 2.19 The nature of research BK 2.20 Problem identification BK 2.21 Research methods in physics education BK 2.22 The function of the classroom as a physics laboratory BK 2.23 Laboratory management BK 2.24 Health and Safety in the Physics Laboratory BK 2.25 Principles of Scientific Writing BK 2.26 Principles of scientific writing BK 2.27 Basic concepts of microteaching BK 2.28 Teachers' pedagogical competencies BK-2.29 Probability BK 9.1 Creative multimedia research BK 9.2 Multimedia Project Proposal BK 9.3 Visual direction (storyline) BK 9.4 Visual assets (graphic design, animation, graphic video) BK 9.5 Integration of all multimedia components related to audio and visuals |



| PLO | Study Materials |
|--|--|
| | BK 1.15 Mastery of educational disciplines BK 1.16 Teaching BK 1.17 Teaching BK 1.18 Teaching BK 6.2 Conducting research in physics education BK 6.3 Writing up research findings |
| PLO 3. Mastering theoretical concepts of classical and modern physics, principles and applications of mathematics, computation, and physics instrumentation, as well as operational knowledge of instruments and software used in the field of physics and its teaching. | BK-3.1 Functions BK-3.2 Limits BK-3.3 Derivatives BK-3.4 Integrals BK-3.5 Matrix operations BK-3.6 Complex numbers BK-3.7 Series BK-3.8 Complex Algebra and Functions BK-3.9 Ordinary Differential Equations BK-3.10 Partial Differential Equations BK-3.11 Integral transformations BK-3.12 Systems of linear equations BK-3.13 Variational calculus BK-3.14 Computer programming BK-3.15 Introduction to Numerical Methods BK-3.16 DC Circuits BK-3.17 Thevenin's and Norton's Theorems BK-3.18 AC Circuits BK-3.19 Semiconductors BK-3.20 Testing the performance of analogue electronics BK-3.21 Electrical Measurement Instruments BK-3.22 Logic Gates BK-3.23 Sensors BK-3.24 Digital electronics performance testing BK-3.25 Simple signal processing BK-3.26 Output devices BK-3.27 Digital data transmission BK-3.28 Newton's Concept of Space-Time BK-3.29 Fundamental quantities of motion BK-3.30 Types of motion BK-3.31 Analysis of particle motion BK-3.32 Newton's Laws BK-3.33 Applications of Newton's Laws BK-3.34 Work and energy BK.3.35 Gravity BK-3.36 Fluid Concepts BK-3.37 Ideal Fluids BK-3.38 Viscous Fluids BK-3.39 Temperature and heat BK-3.40 Transport Phenomena BK-3.41 Thermodynamic Systems BK-3.42 The zeroth law of thermodynamics BK-3.43 Ideal gases |



| PLO | Study Materials |
|-----|---|
| | BK-3.44 The First Law of Thermodynamics BK-3.45 The second law of thermodynamics: entropy, the principle of maximum entropy, the Carnot process BK-3.46 Entropy BK-3.47 Motion of a many-particle system BK-3.48 Motion of rigid bodies BK-3.49 Non-inertial reference frames BK-3.50 Lagrangian and Hamiltonian formulations BK-3.51 Motion in a central force field BK-3.52 Linear vibrations BK-3.53 Waves BK-3.54 Physical Optics BK-3.55 Geometric Optics BK-3.56 Propagation of light BK-3.57 Coulomb's Law BK-3.58 Static electric field BK-3.59 Work and potential energy BK-3.60 Conductors, insulators and semiconductors BK-3.61 Capacitors BK-3.62 Electrostatics BK-3.63 Electric current BK-3.64 Magnetic fields BK-3.65 Magnetism BK-3.66 Maxwell's Equations BK-3.67 Maxwell's Equations BK-3.68 Wave Polarisation BK-3.69 Theory of Relativity BK-3.70 History of quantum physics BK-3.71 Schrödinger's Equation BK-3.72 Applications of the Schrödinger Equation BK-3.73 Physics Experiments BK-3.74 Structure and properties of the atomic nucleus BK-3.75 Radioactivity BK-3.76 Types of Nuclear Radiation BK-3.77 Nuclear Reactions BK-3.78 Elementary Particles BK-3.79 Kinetic theory of ideal gases BK-3.80 Maxwell's Equations BK-3.81 Crystal structure BK-3.82 Crystal lattice dynamics BK-3.83 Free-electron model BK-3.84 Energy Band Theory BK-3.85 Semiconductor Materials BK-3.86 Dielectric Materials BK-3.87 Environmental Physics BK-3.88 Introduction to Astronomy BK-3.89 Biology BK-3.90 Chemistry BK-10.1 Electronics Safety BK-10.2 Electronic Components and Instrumentation |



| PLO | Study Materials |
|--|--|
| | BK-10.3 PCB Assembly and Wiring System Installation BK-10.4 Diagnosis and repair of faults in electronic devices BK-10.5 Fabrication of electronic circuit prototypes using conventional methods and E-CAD BK-10.6 Designing embedded programming systems on microcontrollers and various interfaces |
| PLO 4. Able to design, implement, manage, and evaluate secondary school physics learning independently and innovatively using a scientific approach, based on pedagogical content knowledge and instructional design principles, as well as effectively utilising science and technology and learning resources (including laboratories) to develop students' scientific thinking skills | BK 1.15 1. Mastery of the field of educational science 2. Knowledge of the Programme's Academic Discipline 3. Understanding of students BK 1.16 Learning BK 1.17 1. Learning 2. Knowledge of physics BK 1.18 1. Learners' understanding 2. Learning 3. Mastery of educational science 4. Knowledge of the academic field of the study programme BK 2.1 Foundations of Education BK 2.2 Student Development BK 2.6 21st-century skills BK 2.7 Basic teaching skills BK 2.8 Physics Instructional Design BK 2.16 Aspects of Assessment BK 2.17 Computer-assisted assessment of literacy, numeracy and higher-order thinking skills BK 2.22 The Classroom as a Physics Laboratory BK-2.29 Probability BK-4.1 Micro Lesson Plan (RPP) BK-4.2 Eight basic teaching skills BK-4.3 Application of learning media and technology BK-4.4 Teaching simulation practice (microteaching) BK-4.5 Learning evaluation and reflection |
| PLO 5. Able to apply concepts of classical and modern physics, mathematics, and instrument and software technology to analyse and solve physics problems accurately and systematically. | BK-3.1 Functions BK-3.2 Limits BK-3.3 Derivatives BK-3.4 Integrals BK-3.5 Matrix operations BK-3.6 Complex numbers BK-3.7 Series BK-3.8 Complex Algebra and Functions BK-3.9 Ordinary Differential Equations BK-3.10 Partial Differential Equations BK-3.11 Integral transforms BK-3.12 Systems of linear equations BK-3.13 Variational calculus BK-3.14 Computer programming BK-3.15 Introduction to Numerical Methods |



| PLO | Study Materials |
|-----|---|
| | BK-3.16 DC Circuits BK-3.17 Thevenin's and Norton's Theorems BK-3.18 AC Circuits BK-3.19 Semiconductors BK-3.20 Testing the performance of analogue electronics BK-3.21 Electrical Measurement Instruments BK-3.23 Sensor Devices BK-3.24 Digital electronics performance testing BK-3.28 Newton's Concept of Space-Time BK-3.29 Fundamental quantities of motion BK-3.30 Types of motion BK-3.31 Analysis of particle motion BK-3.32 Newton's Laws BK-3.33 Applications of Newton's Laws BK-3.34 Work and energy BK-3.35 Gravity BK-3.36 Fluid Concepts BK-3.37 Ideal Fluids BK-3.38 Viscous Fluids BK-3.39 Temperature and heat BK-3.40 Transport Phenomena BK-3.41 Thermodynamic Systems BK-3.42 The zeroth law of thermodynamics BK-3.43 Ideal gases BK-3.44 The First Law of Thermodynamics BK-3.45 The second law of thermodynamics: entropy, the principle of maximum entropy, the Carnot process BK-3.46 Entropy BK-3.47 Motion of a many-particle system BK-3.48 Motion of rigid bodies BK-3.49 Non-inertial reference frames BK-3.50 Lagrangian and Hamiltonian formulations BK-3.51 Motion in a central force field BK-3.52 Linear vibrations BK-3.53 Waves BK-3.54 Physical Optics BK-3.55 Geometric Optics BK-3.56 Propagation of light BK-3.57 Coulomb's Law BK-3.58 Static electric field BK-3.59 Work and potential energy BK-3.60 Conductors, insulators and semiconductors BK-3.61 Capacitors BK-3.62 Electrostatics BK-3.63 Electric current BK-3.64 Magnetic fields BK-3.65 Magnetism BK-3.66 Maxwell's Equations BK-3.67 Maxwell's Equations BK-3.68 Wave Polarisation |



| PLO | Study Materials |
|---|---|
| | BK-3.69 Theory of Relativity BK-3.70 History of quantum physics BK-3.71 Schrödinger's Equation BK-3.72 Applications of the Schrödinger Equation BK-3.73 Physics Experiments BK-3.74 Structure and properties of the atomic nucleus BK-3.75 Radioactivity BK-3.76 Types of Nuclear Radiation BK-3.77 Nuclear reactions BK-3.78 Elementary Particles BK-3.79 Kinetic theory of ideal gases BK-3.80 Maxwell's Equations BK-3.81 Crystal structure BK-3.82 Crystal lattice dynamics BK-3.83 Free Electron Model BK-3.84 Band Theory BK-3.85 Semiconductor Materials BK-3.86 Dielectric Materials BK-3.87 Environmental Physics BK-3.88 Introduction to Astronomy BK-3.89 Biology BK-3.90 Chemistry |
| PLO 6. Able to conduct research and scientific studies in the field of physics education as an alternative problem-solving approach to produce published scientific papers | BK-6.1 Drafting a research proposal BK-6.2 Conducting research in physics education BK-6.3 Writing up research findings BK-6.4 Publication process |
| PLO 7. Able to make appropriate decisions based on the analysis of information and data in the field of physics education, and able to provide guidance in selecting various alternative solutions, both independently and in groups. | BK 1.15 1. Mastery of the scientific field of education 2. Knowledge of the programme's academic discipline 3. Understanding of learners BK 1.16 Learning BK 1.17 1. Teaching 2. Knowledge of the field of physics BK 1.18 1. Learners' understanding 2. Learning 3. Mastery of educational science 4. Knowledge of the academic discipline of the degree programme BK 2.3 Theories of learning and teaching in physics BK 2.4 Revised Bloom's Taxonomy BK 2.5 Philosophy of physics BK 2.7 Basic teaching skills BK 2.9 English for physics instruction BK 2.11 Development of teaching materials and learning media BK 2.13 Physics curriculum for Year 10 secondary school BK 2.14 Physics curriculum in Year 11 secondary schools |



| PLO | Study Materials |
|---|---|
| | BK 2.16 Aspects of assessment BK 2.17 Computer-assisted assessment of literacy, numeracy and higher-order thinking skills BK 2.18 Item analysis BK 2.19 The nature of research BK 2.20 Problem identification BK 2.21 Research methods in physics education BK 2.24 Health, Safety and Welfare in the Physics Laboratory |
| PLO 8. Takes responsibility for the field of physics education and can be entrusted with responsibility for the achievement of group work outcomes. | BK 1.14 Community Empowerment BK 2.1 Foundations of Education BK 2.4 Revised Bloom's Taxonomy BK 2.5 Philosophy of Physics BK 2.6 21st-century skills BK 2.7 Basic teaching skills BK 2.9 <i>English for Physics Instruction</i> BK 2.10 <i>Academic Writing for Physics Education Research</i> BK 2.12 Video, Animation and Graphic Design BK 2.13 Physics Curriculum for Year 10 Secondary School BK 2.14 Physics curriculum in Year 11 secondary schools BK 2.17 Computer-assisted assessment of literacy, numeracy and higher-order thinking skills BK 2.21 Research Methods in Physics Education BK 2.23 Laboratory Management BK 2.25 Principles of scientific writing BK-4.4 Teaching simulation practice (microteaching) |
| PLO 9. Able to creatively and contextually develop innovative technology-based multimedia learning resources, and manage educational products as a manifestation of entrepreneurship in the field of education | BK 2.11 Development of teaching materials and learning media BK 9.1 Creative multimedia research BK 9.2 Multimedia project proposals BK 9.3 Visual direction (storyline) BK 9.4 Visual assets (graphic design, animation, graphic video) BK 9.5 Integration of all multimedia components related to audio and visuals |
| PLO 10. Able to independently develop prototype electronics-based systems or products and software. | BK-10.1 Electronics health and safety BK-10.2 Electronic components and instrumentation devices BK-10.3 PCB assembly and wiring system installation BK-10.4 Diagnosis and repair of faults in electronic devices BK-10.5 Fabrication of electronic circuit prototypes using conventional methods and E-CAD BK-10.6 Designing embedded programming systems on microcontrollers and various interfaces |
| PLO 11. Evaluating and integrating concepts of religion, nationality, the constitution, language, and technology-based entrepreneurship with the 5A values (anti-violence, anti-drugs, anti-bullying, anti-intolerance, and anti-corruption) to | BK 1.1 Islam BK 1.2 Christianity BK 1.3 Catholicism BK 1.4 Buddhism BK 1.5 Hinduism |



| PLO | Study Materials |
|---|---|
| support the development of professional knowledge and practice. | BK 1.6 Confucianism BK 1.7 Pancasila Education BK 1.8 Civics Education BK 1.9 1. The nature of Indonesian as the language of unity and the national language; 2. Exploring texts in academic life (instilling values and the nature of the Indonesian language as a vehicle for knowledge); 3. Exploring the world of libraries; 4. Designing research proposals and activity proposals; 5. Reporting research findings and activity outcomes; and 6. Expressing oneself in academic articles. BK 1.10 PGRI Studies BK 1.11 1. <i>Simple Present Tense</i> 2. <i>Present Continuous Tense</i> 3. <i>Simple Past Tense</i> 4. <i>Present Perfect Tense</i> 5. <i>Simple Future Tense</i> BK 1.12 1. <i>Design thinking</i> 2. <i>Business Model Canvas</i> 3. <i>Prototyping</i> BK 1.13 1. <i>Marketing Plan and Channels</i> 2. <i>Planning and Strategising</i> 3. <i>Unit Product Cost & Pricing Method</i> 4. <i>Business Planning & Feasibility Study</i> 5. <i>Intention to Become an Entrepreneur</i> 6. <i>Communication & Negotiation Skills</i> BK 1.14 Community Empowerment |



| No | PLO Code | PLO Description | Study Materials (BK) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--------|----------|---|-----------------------------|-------------------------------|---------------------------|------------------------------|-------------------------------|---------------------|------------------|---------------------|--------------|---------|-----------------------------------|--|--------------------------------|------------------------------|------------------------------|--|---------------|---------|---------|---------|---------|---------|--------------------------|-------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--|
| | | | BK-1.1 | SL-1.2 | SL-1.3 | C-M-1.4 | R-M-1.5 | BK-1.6 | BK-1.7 | BK-1.8 | BK-1.9 | BK-1.10 | BK-1.11 | BK-1.12 | BK-1.13 | BK-1.14 | BK-1.15 | BK-1.16 | BK-1.17 | BK-1.18 | BK-1.19 | BK-2.25 | BK-2.26 | BK-2.27 | BK-2.28 | BK-4.1 | BK-4.2 | BK-4.3 | BK-4.4 | BK-4.5 | BK-2.1 | BK-2.2 | BK-2.3 | BK-2.4 | |
| 11 | PLO 11 | Evaluate and integrate concepts of religion, nationalism, the constitution, language, and technology-based entrepreneurship with the 5A values (anti-violence, anti-drugs, anti-bullying, anti-intolerance, and anti-corruption) to support the development of professional knowledge and practice. | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | | | | | | | | | | | | | | | | | | | | |
| Course | | | Islamic Religious Education | Christian Religious Education | Hindu Religious Education | Buddhist Religious Education | Confucian Religious Education | Pancasila Education | Civics Education | Indonesian Language | PGRI Studies | English | Technology-Based Entrepreneurship | Community Service - Problem Solving in the | INTERNET - Curriculum Analysis | INTERNET - SIP - Development | INTERNET - Teaching Practice | Scientific Publications in Physics Education | Microteaching | | | | | | Foundations of Education | Learning and Teaching Physics | | | | | | | | | |



| No | PLO Code | PLO Description | Study Materials (BK) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----|----------|--|----------------------|-----------|-----------|-----------|-----------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|---|---|--|
| | | | BK 2.5 | SL 2.6 | SL 2.7 | SL 2.8 | SR 2.9 | BK 2.1 0 | BK 2.1 1 | BK 2.1 2 | BK 2.1 3 | BK 2.1 4 | BK 2.1 5 | BK 2.1 6 | BK 2.1 7 | BK 2.1 8 | BK 2.1 9 | BK 2.2 0 | BK 2.2 1 | BK 2.2 2 | BK 2.2 3 | BK 2.2 4 | BK 2.2 6 | BK 6.1 9 | BK 2.2 9 | BK 3.1 | BK 3.2 | BK 3.3 | BK 3.4 | BK 3.5 | BK 3.6 | BK 3.7 | BK 3.8 | BK 3.9 | | | |
| 4 | PLO 4 | Able to design, implement, manage, and evaluate secondary school physics teaching independently and innovatively using a scientific approach, based on pedagogical content knowledge and instructional design principles, whilst effectively utilising science and technology and learning resources (including laboratories) to develop students' scientific thinking skills. | | | √ | √ | | | | | | | | √ | √ | | | | | | | | | | | | √ | | | | | | | | | | |
| 5 | PLO 5 | Able to apply concepts of classical and modern physics, mathematics, and instrumentation and software technology to analyse and solve physics problems accurately and systematically. | | | | | | | | | | | | | | | | | | | | | | | | | | √ | √ | √ | √ | √ | √ | √ | √ | √ | |



| No | PLO Code | PLO Description | Study Materials (BK) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----|----------|-----------------|--|--|--|---|--|---|---|--|------------------------------|---|--|--------------------------|----------|---------|---------|---------|---------|---|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| | | | BK-2.5 | SL-2.6 | SL-2.7 | SL-2.8 | SR-2.9 | BK-2.10 | BK-2.11 | BK-2.12 | BK-2.13 | BK-2.14 | BK-2.15 | BK-2.16 | BK-2.17 | BK-2.18 | BK-2.19 | BK-2.20 | BK-2.21 | BK-2.22 | BK-2.23 | BK-2.24 | BK-2.25 | BK-2.26 | BK-2.27 | BK-2.28 | BK-2.29 | BK-2.30 | BK-2.31 | BK-2.32 | BK-2.33 | BK-2.34 | BK-2.35 | BK-2.36 |
| | | Course | Philo- so- phy of Sci- ence | Physic- s Teachi- ng Strate- gies | Phy- sics Instru- ctional Design | Englis- h for Physi- cs Instru- ction | Physic- s Teachi- ng Materi- als and Resour- ces | Se- co- nd- ary Sci- ence Phy- sics, Year 10 | Se- co- nd- ary Sci- ence Phy- sics, Year 11 | Assessment of Learning Processes and Outcomes | Research Methodol- ogy | Education al Physics Laborator- y | Final Projec- t Propo- sal Semin- ar | Basic Stati- stics | Calculus | | | | | Introduction to Mathematical Physics | | | | | | | | | | | | | | |



| No | PLO Code | PLO Description | Course Content (CC) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----|----------|---|---------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|---|---|---|
| | | | BK | SL | SL | SL | SR | BK | BK | BK | BK | BK | BK | BK | BK | BK | BK | BK | BK | BK | BK | BK | BK | BK | BK | BK | BK | BK | BK | BK | B | | | |
| | | | - | 3.1 | 3.1 | - | 3.1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | K- | | | |
| | | | 3.1 | 1 | 2 | 3.1 | 4 | 3.1 | 3.1 | 3.1 | 3.1 | 3.1 | 3.2 | 3.2 | 3.2 | 3.2 | 3.2 | 3.2 | 3.2 | 3.2 | 10. | 3.2 | 3.2 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 | 3.4 | | | | |
| | | | 0 | | | 3 | | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 4 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 |
| 1 | PLO 1 | Able to demonstrate character and conduct that reflect adaptability, enthusiasm and integrity as an expression of devotion to God Almighty. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | PLO 2 | Understands educational theory and learner development, research methodology in physics education, as well as the principles, methods, and techniques of contextual physics learning utilising ICT. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | PLO 3 | Mastering theoretical concepts of classical and modern physics, principles and applications of mathematics, computation, and physics instrumentation, as well as operational knowledge of instruments and software used in the field of physics and its teaching. | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |



| No | PLO Code | PLO Description | Course Content (CC) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | | | BK | SL | SL | SL | SR | BK | BK | BK | BK | BK | BK | BK | BK | BK | BK | BK | BK | BK | BK | BK | BK | BK | BK | BK | BK | BK | BK | BK | BK | B | |
| | | | - | 3.1 | 3.1 | - | 3.1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | K- | |
| | | | 3.1 | 1 | 2 | 3.1 | 4 | 3.1 | 3.1 | 3.1 | 3.1 | 3.1 | 3.2 | 3.2 | 3.2 | 3.2 | 3.2 | 3.2 | 3.2 | 3.2 | 3.2 | 3.2 | 3.2 | 3.2 | 10. | 3.2 | 3.2 | 3.3 | 3.3 | 3.3 | 3.3 | 3.4 | |
| | | | 0 | | | 3 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 4 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 |
| 6 | PLO 6 | Able to conduct research and scientific studies in the field of physics education as an alternative problem-solving approach to produce published scientific papers. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | PLO 7 | Able to make appropriate decisions based on the analysis of information and data in the field of physics education, and able to provide guidance in selecting various alternative solutions, both independently and in groups. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | PLO 8 | Take responsibility for the field of physics education and be entrusted with responsibility for the achievement of group work outcomes. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | PLO 9 | Able to creatively and contextually develop innovative technology-based multimedia learning resources, and manage | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



| No | PLO Code | PLO Description | Course Content (CC) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | | | BK | SL | SL | SL | SR | BK | BK | BK | BK | BK | BK | BK | BK | BK | BK | BK | BK | BK | BK | BK | BK | BK | BK | BK | BK | BK | BK | BK | | | | |
| | | educational products as a form of entrepreneurship in the field of education. | - | 3.1 | 3.1 | - | 3.1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | | | |
| | | | 3.1 | 1 | 2 | 3.1 | 4 | 3.1 | 3.1 | 3.1 | 3.1 | 3.1 | 3.2 | 3.2 | 3.2 | 3.2 | 3.2 | 3.2 | 3.2 | 3.2 | 3.2 | 10. | 3.2 | 3.2 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 | 3.4 | | |
| | | | 0 | | | 3 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 4 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | |
| 10 | PLO 10 | Able to independently develop prototype electronics-based systems or products and software. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11 | PLO 11 | Evaluate and integrate concepts of religion, nationalism, the constitution, language, and technology-based entrepreneurship with the 5A values (anti-violence, anti-drugs, anti-bullying, anti-intolerance, and anti-corruption) to support the development of professional knowledge and practice. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



| No | PLO Code | PLO Description | Course Materials (CM) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----|----------|---|-----------------------|---------|---------|---------|------|------|------|------|------|------|------|------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--|--|--|--|
| | | | BK-3.47 | BK-3.48 | BK-3.49 | BK-3.50 | SR-1 | BK-2 | BK-3 | BK-4 | BK-5 | BK-6 | BK-7 | BK-8 | BK-9 | BK-10 | BK-11 | BK-12 | BK-13 | BK-14 | BK-15 | BK-16 | BK-17 | BK-18 | BK-19 | BK-20 | BK-21 | BK-22 | BK-23 | BK-24 | BK-25 | BK-26 | BK-27 | BK-28 | | | | |
| 1 | PLO 1 | Able to demonstrate character and conduct that reflect adaptability, enthusiasm and integrity as an expression of devotion to God Almighty. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | PLO 2 | Understands educational theory and learner development, research methodology in physics education, as well as the principles, methods, and techniques of contextual physics learning utilising ICT. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



| No | PLO Code | PLO Description | Course Materials (CM) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----|----------|---|-----------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| | | | BK-3.47 | BK-3.48 | BK-3.49 | BK-3.50 | SR-3.51 | BK-3.52 | BK-3.53 | BK-3.54 | BK-3.55 | BK-3.56 | BK-3.57 | BK-3.58 | BK-3.59 | BK-3.60 | BK-3.61 | BK-3.62 | BK-3.63 | BK-3.64 | BK-3.65 | BK-3.66 | BK-3.67 | BK-3.68 | BK-3.69 | BK-3.70 | BK-3.71 | BK-3.72 | BK-3.73 | BK-3.74 | BK-3.75 | BK-3.76 | BK-3.77 | BK-3.78 |
| 3 | PLO 3 | Mastering theoretical concepts of classical and modern physics, principles and applications of mathematics, computation, and physics instrumentation, as well as operational knowledge of instruments and software used in the field of physics and its teaching. | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| 4 | PLO 4 | Able to design, implement, manage and evaluate secondary school physics teaching independently and innovatively using a scientific approach, based on pedagogical content knowledge and instructional design principles, | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



| No | PLO Code | PLO Description | Course Materials (CM) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----|----------|---|-----------------------|---------|---------|---------|----|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|--|
| | | | BK-3.47 | BK-3.48 | BK-3.49 | BK-3.50 | SR | BK-3.51 | BK-3.52 | BK-3.53 | BK-3.54 | BK-3.55 | BK-3.56 | BK-3.57 | BK-3.58 | BK-3.59 | BK-3.60 | BK-3.61 | BK-3.62 | BK-3.63 | BK-3.64 | BK-3.65 | BK-3.66 | BK-3.67 | BK-3.68 | BK-3.69 | BK-3.70 | BK-3.71 | BK-3.72 | BK-3.73 | BK-3.74 | BK-3.75 | BK-3.76 | BK-3.77 | BK-3.78 | |
| | | whilst effectively utilising science and technology and learning resources (including laboratories) to develop students' scientific thinking skills. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | PLO 5 | Able to apply concepts of classical and modern physics, mathematics, and instrumentation and software technology to analyse and solve physics problems accurately and systematically. | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | |
| 6 | PLO 6 | Able to conduct research and scientific studies in the field of physics education as an alternative problem-solving approach to | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



| No | PLO Code | PLO Description | Course Materials (CM) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----|----------|---|-----------------------|---------|---------|---------|----|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|--|--|--|--|
| | | | BK-3.47 | BK-3.48 | BK-3.49 | BK-3.50 | SR | BK-3.51 | BK-3.52 | BK-3.53 | BK-3.54 | BK-3.55 | BK-3.56 | BK-3.57 | BK-3.58 | BK-3.59 | BK-3.60 | BK-3.61 | BK-3.62 | BK-3.63 | BK-3.64 | BK-3.65 | BK-3.66 | BK-3.67 | BK-3.68 | BK-3.69 | BK-3.70 | BK-3.71 | BK-3.72 | BK-3.73 | BK-3.74 | BK-3.75 | BK-3.76 | BK-3.77 | BK-3.78 | | | | |
| 9 | PLO 9 | Able to creatively and contextually develop innovative technology-based multimedia learning resources, and manage educational products as a form of entrepreneurship in the field of education. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | PLO 10 | Able to independently develop prototype electronics-based systems or products and software. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11 | PLO 11 | Evaluate and integrate concepts of religion, nationalism, the constitution, language, and technology-based entrepreneurship with the 5A values (anti-violence, anti- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



| No | PLO Code | PLO Description | Course Materials (CM) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----|----------|---|-----------------------|---------|---------|---------|----------------------|------------------|---------|---------|---------|---------|----------------------------------|---------|---------|---------|---------|---------|---------|---------|---------------------------|----------------|-----------------------------------|---------------------|-----------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|--|
| | | | BK-3.47 | BK-3.48 | BK-3.49 | BK-3.50 | SR-3.51 | BK-3.52 | BK-3.53 | BK-3.54 | BK-3.55 | BK-3.56 | BK-3.57 | BK-3.58 | BK-3.59 | BK-3.60 | BK-3.61 | BK-3.62 | BK-3.63 | BK-3.64 | BK-3.65 | BK-3.66 | BK-3.67 | BK-3.68 | BK-3.69 | BK-3.70 | BK-3.71 | BK-3.72 | BK-3.73 | BK-3.74 | BK-3.75 | BK-3.76 | BK-3.77 | BK-3.78 | |
| | | drugs, anti-bullying, anti-intolerance, and anti-corruption) to support the development of professional knowledge and practice. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Course | Classical Mechanics | | | | Mechanics of Systems | Waves and Optics | | | | | Fundamentals of Electromagnetism | | | | | | | | Electricity and Magnetism | Modern Physics | Introduction to Quantum Mechanics | Physics Experiments | Nuclear Physics | | | | | | | | | | |

| No | PLO Code | PLO Description | Study Materials (BK) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----|----------|-----------------|----------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|--------|--------|--------|--------|--------|--------|--------|---------|---------|---------|---------|---------|--|--|--|--|--|--|--|--|
| | | | BK-3.79 | BK-3.80 | BK-3.81 | BK-3.82 | BK-3.83 | BK-3.84 | BK-3.85 | BK-3.86 | BK-3.87 | BK-3.88 | BK-3.89 | BK-3.90 | BK-3.91 | BK-10.5 | BK-6.2 | BK-6.3 | BK-9.1 | BK-9.2 | BK-9.3 | BK-9.4 | BK-9.5 | BK-10.1 | BK-10.2 | BK-10.3 | BK-10.5 | BK-10.6 | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



| No | PLO Code | PLO Description | Study Materials (BK) | | | | | | | | | | | | | | | | | | | | | | | | | |
|----|----------|---|----------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|--------|--------|--------|--------|--------|--------|--------|---------|---------|---------|---------|---------|
| | | | BK-3.79 | BK-3.80 | BK-3.81 | BK-3.82 | BK-3.83 | BK-3.84 | BK-3.85 | BK-3.86 | BK-3.87 | BK-3.88 | BK-3.89 | BK-3.90 | BK-3.91 | BK-10.5 | BK-6.2 | BK-6.3 | BK-9.1 | BK-9.2 | BK-9.3 | BK-9.4 | BK-9.5 | BK-10.1 | BK-10.2 | BK-10.3 | BK-10.5 | BK-10.6 |
| 1 | PLO 1 | Able to demonstrate character and conduct that reflect adaptability, enthusiasm and integrity as an expression of devotion to God Almighty. | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | PLO 2 | Understand educational theory and learner development, research methodology in physics education, as well as the principles, methods, and techniques of contextual physics learning utilising ICT. | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | PLO 3 | Mastering theoretical concepts of classical and modern physics, principles and applications of mathematics, computation, and physics instrumentation, as well as operational knowledge of instruments and software used in the field of physics and its teaching. | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | | | | | | | | | | | | | | |



| No | PLO Code | PLO Description | Study Materials (BK) | | | | | | | | | | | | | | | | | | | | | | | |
|----|----------|-----------------|----------------------------|---------------------|---------|---------|---------|---------|---------|---------|---------|--------------------|--------------------------------|--------------------------------|--------------|------------------|---|--|--|---|--------|------------------|--|---------|---------|---------|
| | | | BK-3.79 | BK-3.80 | BK-3.81 | BK-3.82 | BK-3.83 | BK-3.84 | BK-3.85 | BK-3.86 | BK-3.87 | BK-3.88 | BK-3.89 | BK-3.90 | BK-3.91 | BK-10.5 | BK-6.2 | BK-6.3 | BK-9.1 | BK-9.2 | BK-9.3 | BK-9.4 | BK-9.5 | BK-10.1 | BK-10.2 | BK-10.3 |
| | | Course | Statistic al Physics | Solid State Physics | | | | | | | | Applied Physics | Ge ner al Bio logy | Bas ic Ch emi stry | Robotic s | Final Project | Multime dia Project Researc h and Design | Dig ital Vis ual and Nar rati ve De vel op me nt | Mu l ti me dia Ass et Des ign and Pro duc tion | A u di o- V is u al In te gr at io n in M ul ti m e di a | PCB | Ro boti cs | Em bed ded Sys tem s Pro gra mm ing | | | |



Table 6.3 Calculation of credit weight for each course

| Course No. | Course Name | PLO Assigned to the Course | Duration required to achieve PLO (in hours / SKS) | Total (in hours / ECTS) | Conversion to SKS |
|------------|-------------------------------|---|---|-------------------------|--------------------|
| (1) | (2) | (3) | (4) | (5) | (6) |
| 1 | Islam Religious Education | PLO 1. Able to demonstrate character and conduct that reflect adaptability, enthusiasm and integrity as an expression of devotion to God Almighty. | 10 | 10 | 100/45 = 2 credits |
| | | | 30 | 30 | |
| | | PLO 11. Evaluate and integrate concepts of religion, nationalism, the constitution, language and technology-based entrepreneurship with the 5A values (anti-violence, anti-drugs, anti-bullying, anti-intolerance and anti-corruption) to support the development of professional knowledge and practice. | 20 | 60 | |
| | | | 20 | | |
| | | | 10 | | |
| | | | 10 | | |
| 2 | Christian Religious Education | PLO 2. Evaluate and integrate concepts relating to religion, nationalism, the constitution, language and technology-based entrepreneurship with the 5A values (anti-violence, anti-drugs, anti-bullying, anti-intolerance and anti-corruption) to support the development of professional knowledge and practice. | 5 | 40 | |
| | | | 5 | | |
| | | | 10 | | |
| | | | 5 | | |
| | | | 5 | | |
| | | | 10 | | |
| | | PLO 1. Able to demonstrate character and conduct that reflect adaptability, enthusiasm and integrity as an expression of devotion to God Almighty. | 5 | 45 | |
| | | | 5 | | |
| | | | 10 | | |
| | | | 5 | | |
| | | | 10 | | |
| | | | 10 | | |
| 3 | Catholic Religious Education | PLO 2. Evaluate and integrate concepts relating to religion, nationhood, the constitution, language and technology-based entrepreneurship with the 5A values (anti-violence, anti-drugs, anti-bullying, anti-intolerance and anti-corruption) to support the development of professional knowledge and practice. | 5 | 20 | 85/45 = 2 credits |
| | | | 5 | | |
| | | | 10 | | |
| | | | 5 | 20 | |
| | | | 15 | | |
| | | | 5 | 15 | |
| | | PLO 1. Able to demonstrate character and conduct that reflect adaptability, enthusiasm and integrity as an expression of devotion to God Almighty. | 10 | | |
| | | | 5 | 30 | |
| | | | 10 | | |
| | | | 15 | | |
| | | | | | |
| | | | | | |



| Course No. | Course Name | PLO Assigned to the Course | Duration required to achieve PLO (in hours / SKS) | Total (in hours / ECTS) | Conversion to SKS |
|------------|-------------------------------|--|---|-------------------------|--------------------|
| (1) | (2) | (3) | (4) | (5) | (6) |
| 4 | Buddhist Religious Education | PLO 1. Able to demonstrate character and conduct that reflect adaptability, enthusiasm and integrity as an expression of devotion to God Almighty. | 5 | 5 | 95/45 = 2 credits |
| | | | 10 | 20 | |
| | | 10 | | | |
| | | 10 | 20 | | |
| | | 10 | | | |
| | | 10 | 30 | | |
| | | 10 | | | |
| | | 10 | 20 | | |
| | | 10 | | | |
| 5 | Hindu Religious Education | PLO 1. Able to demonstrate character and conduct that reflect adaptability, enthusiasm and integrity as an expression of devotion to God Almighty. | 5 | 5 | 95/45 = 2 credits |
| | | | 10 | 20 | |
| | | 10 | | | |
| | | 10 | 20 | | |
| | | 10 | | | |
| | | 10 | 30 | | |
| | | 10 | | | |
| | | 10 | 20 | | |
| | | 10 | | | |
| 6 | Confucian Religious Education | PLO 1. Able to demonstrate character and conduct that reflect adaptability, enthusiasm and integrity as an expression of devotion to God Almighty. | 5 | 5 | 95/45 = 2 credits |
| | | | 10 | 20 | |
| | | 10 | | | |
| | | 10 | 20 | | |
| | | 10 | | | |
| | | 10 | 30 | | |
| | | 10 | | | |
| | | 10 | 20 | | |
| | | 10 | | | |
| 7 | Pancasila Education | PLO 1. Able to demonstrate character and conduct that reflect adaptability, | 30 | 30 | 110/45 = 2 credits |
| | | | | | |



| Course No. | Course Name | PLO Assigned to the Course | Duration required to achieve PLO (in hours / SKS) | Total (in hours / ECTS) | Conversion to SKS |
|------------|---------------------|---|---|-------------------------|--------------------|
| (1) | (2) | (3) | (4) | (5) | (6) |
| | | enthusiasm and integrity as an expression of devotion to God Almighty. | 15 | 15 | |
| | | | 15 | 15 | |
| | | PLO 11. Evaluating and integrating concepts of religion, nationalism, the constitution, language, and technology-based entrepreneurship with the 5A values (anti-violence, anti-drugs, anti-bullying, anti-intolerance, and anti-corruption) to support the development of professional knowledge and practice. | 50 | 50 | |
| 8 | Civic Education | PLO 1. Able to demonstrate character and conduct that reflect adaptability, enthusiasm and integrity as an expression of devotion to God Almighty. | 20 | 20 | 100/45 = 2 credits |
| | | PLO 11. Evaluating and integrating concepts of religion, nationalism, the constitution, language, and technology-based entrepreneurship with the 5A values (anti-violence, anti-drugs, anti-bullying, anti-intolerance, and anti-corruption) to support the development of professional knowledge and practice | 40 | 80 | |
| | | | 40 | | |
| 9 | Indonesian Language | PLO 1. Able to demonstrate character and conduct that reflect adaptability, enthusiasm and integrity as an expression of devotion to God Almighty. | 10 | 10 | 95/45 = 2 credits |
| | | PLO 11. Evaluate and integrate concepts relating to religion, nationhood, the constitution, language and technology-based entrepreneurship with the 5A values (anti-violence, anti-drugs, anti-bullying, anti-intolerance and anti-corruption) to support the development of professional knowledge and practice | 10 | 10 | |
| | | | 15 | 75 | |
| | | | 20 | | |
| | | | 20 | | |
| | | | 20 | | |
| 10 | PGRI Studies | PLO 11. Evaluating and integrating concepts relating to religion, nationalism, the constitution, language and technology-based entrepreneurship with the 5A values (anti-violence, anti-drugs, anti-bullying, anti-intolerance and anti-corruption) to support the development of professional knowledge and practice | 4 | 14 | 90/45 = 2 credits |
| | | | 4 | | |
| | | | 6 | | |
| | | | 4 | 14 | |
| | | | 4 | | |
| | | | 6 | | |
| | | | 4 | 16 | |
| | | | 4 | | |



| Course No. | Course Name | PLO Assigned to the Course | Duration required to achieve PLO (in hours / SKS) | Total (in hours / ECTS) | Conversion to SKS |
|---|-----------------------------------|---|---|--|--------------------|
| (1) | (2) | (3) | (4) | (5) | (6) |
| | | | 8 | | |
| | | | 4 | 16 | |
| | | | 4 | | |
| | | | 8 | | |
| | | PLO 1. Able to demonstrate character and conduct that reflect adaptability, enthusiasm and integrity as an expression of devotion to God Almighty. | 7 | 14 | |
| | | PLO 11. Evaluate and integrate concepts of religion, nationalism, the constitution, language and technology-based entrepreneurship with the 5A values (anti-violence, anti-drugs, anti-bullying, anti-intolerance and anti-corruption) to support the development of professional knowledge and practice. | 7 | | |
| | | | 4 | 16 | |
| | | | 4 | | |
| | | 8 | | | |
| | | 11 | English | PLO 1. Able to demonstrate character and conduct that reflect adaptability, enthusiasm and integrity as an expression of devotion to God Almighty. | |
| PLO 11. Evaluating and integrating concepts of religion, nationalism, the constitution, language, and technology-based entrepreneurship with the 5A values (anti-violence, anti-drugs, anti-bullying, anti-intolerance, and anti-corruption) to support the development of professional knowledge and practice. | 20 | 40 | | | |
| | 20 | | | | |
| | 20 | 40 | | | |
| 20 | | | | | |
| 12 | Technology-Based Entrepreneurship | PLO 1. Able to demonstrate character and conduct that reflect adaptability, enthusiasm and integrity as an expression of devotion to God Almighty. | 10 | 10 | 180/45 = 4 credits |
| | | | 30 | 30 | |
| | | | 20 | 40 | |
| | | PLO 11. Evaluate and integrate concepts of religion, nationalism, the constitution, language, and technology-based entrepreneurship with the 5A values (anti-violence, anti-drugs, anti-bullying, anti-intolerance, and anti-corruption) to support the development of professional knowledge and practice. | 20 | | |
| | | | 20 | 22 | |
| | | | 2 | | |
| | | | 10 | 50 | |
| | | | 10 | | |
| | | | 10 | | |
| | | | 10 | | |
| | | | 10 | | |
| | | | 20 | 20 | |
| | | | 6 | 8 | |



| Course No. | Course Name | PLO Assigned to the Course | Duration required to achieve PLO (in hours / SKS) | Total (in hours / ECTS) | Conversion to SKS | |
|------------|---|---|---|-------------------------|--------------------|----|
| (1) | (2) | (3) | (4) | (5) | (6) | |
| 13 | Community Service Programme: Problem Solving in the Community | PLO 1. Able to demonstrate character and conduct that reflect adaptability, enthusiasm and integrity as an expression of devotion to God the Almighty | 20 | 20 | 190/45 = 4 credits | |
| | | | 20 | 20 | | |
| | | | 20 | 20 | | |
| | | PLO 8. Responsible for group work in the field of physics education. | 30 | 60 | | |
| | | | 30 | | | |
| | | | PLO 11. Evaluate and integrate concepts of religion, nationalism, the constitution, language, and technology-based entrepreneurship with the 5A values (anti-violence, anti-drugs, anti-bullying, anti-intolerance, and anti-corruption) to support the development of professional knowledge and practice. | 20 | | 70 |
| | | | | 20 | | |
| 30 | | | | | | |
| 14 | Foundations of Education | PLO 2. Understanding educational theory and learner development, research methodology in physics education, as well as the principles, methods and techniques of contextual physics learning utilising ICT. | 6 | 12 | 100/45 = 2 credits | |
| | | | 6 | | | |
| | | | 12 | 24 | | |
| | | | 12 | | | |
| | | | 12 | 24 | | |
| | | 12 | | | | |
| | | PLO 4. Able to design, implement, manage and evaluate secondary school physics teaching independently and innovatively using a scientific approach, based on <i>pedagogical content knowledge</i> and instructional design principles, as well as effectively utilising science and technology and learning resources (including laboratories) to develop students' scientific thinking skills. | 20 | 40 | | |
| 20 | | | | | | |
| 15 | Student Development | PLO 2. Understanding educational theory and learner development, research methodology in physics education, as well as the principles, methods and techniques of contextual physics learning utilising ICT. | 6 | 18 | 94/45 = 2 credits | |
| | | | 6 | | | |
| | | | 6 | | | |
| | | | 6 | 18 | | |
| | | | 6 | | | |
| | | 6 | | | | |
| | | PLO 4. Able to design, implement, manage and evaluate secondary school | 6 | 18 | | |
| 6 | | | | | | |



| Course No. | Course Name | PLO Assigned to the Course | Duration required to achieve PLO (in hours / SKS) | Total (in hours / ECTS) | Conversion to SKS |
|------------|-----------------|--|---|-------------------------|-------------------|
| (1) | (2) | (3) | (4) | (5) | (6) |
| | | physics teaching independently and innovatively using a scientific approach, based on <i>pedagogical content knowledge</i> and instructional design principles, as well as effectively utilising science and technology and learning resources (including laboratories) to develop students' scientific thinking skills. | 6 | | |
| | | PLO 8. Responsible for group work in the field of physics education. | 20 | 40 | |
| | | | 20 | | |
| 16 | General Biology | PLO 3. Mastery of the theoretical concepts of classical and modern physics, the principles and applications of mathematics, computation and physics instrumentation, as well as operational knowledge of the instruments and software used in the field of physics and its teaching. | 8 | 24 | 90/45 = 2 credits |
| | | | 8 | | |
| | | | 8 | | |
| | | | 8 | 24 | |
| | | | 8 | | |
| | | | 8 | | |
| | | | 8 | 24 | |
| | | | 8 | | |
| | | | 8 | | |
| | | PLO 5. Able to apply concepts of classical and modern physics, mathematics, and instrumentation and software technology to analyse and solve physics problems accurately and systematically. | 9 | 18 | |
| | | | 9 | | |
| 17 | Basic Chemistry | PLO 3. Mastery of the theoretical concepts of classical and modern physics, the principles and applications of mathematics, computation and physics instrumentation, as well as operational knowledge of the instruments and software used in the field of physics and its teaching. | 8 | 24 | 90/45 = 2 credits |
| | | | 8 | | |
| | | | 8 | | |
| | | | 8 | 24 | |
| | | | 8 | | |
| | | | 8 | | |
| | | | 8 | 24 | |
| | | | 8 | | |
| | | | 8 | | |
| | | PLO 5. Able to apply concepts of classical and modern physics, mathematics, and instrumentation and software technology to analyse and solve physics problems accurately and systematically. | 9 | 18 | |
| | | | 9 | | |
| 18 | Calculus | PLO 3. Mastery of the theoretical concepts of classical and modern physics, | 18 | 54 | 90/45=2 credits |
| | | | 18 | | |



| Course No. | Course Name | PLO Assigned to the Course | Duration required to achieve PLO (in hours / SKS) | Total (in hours / ECTS) | Conversion to SKS |
|------------|--------------------------------------|--|---|-------------------------|--------------------|
| (1) | (2) | (3) | (4) | (5) | (6) |
| | | the principles and applications of mathematics, computation and physics instrumentation, as well as operational knowledge of the instruments and software used in the field of physics and its teaching. | 18 | | |
| | | | 18 | 18 | |
| | | PLO 5. Able to apply concepts of classical and modern physics, mathematics, and instrumentation and software technology to analyse and solve physics problems accurately and systematically. | 18 | 18 | |
| 19 | Basic Physics: Mechanics and Thermal | PLO 3. Mastery of the theoretical concepts of classical and modern physics, the principles and applications of mathematics, computation and physics instrumentation, as well as operational knowledge of the instruments and software used in the field of physics and its teaching. | 45 | 135 | 180/45 = 4 credits |
| | | | 45 | | |
| | | | 45 | | |
| | | PLO 5. Able to apply concepts of classical and modern physics, mathematics, and instrumentation and software technology to analyse and solve physics problems accurately and systematically. | 45 | 45 | |
| 20 | Basic Physics: Electromagnetism | PLO 3. Mastery of theoretical concepts in classical and modern physics, the principles and applications of mathematics, computation and physics instrumentation, as well as operational knowledge of the instruments and software used in the field of physics and its teaching. | 45 | 135 | 180/45 = 4 ECTS |
| | | | 45 | | |
| | | | 45 | | |
| | | PLO 5. Able to apply concepts of classical and modern physics, mathematics, and instrumentation and software technology to analyse and solve physics problems accurately and systematically. | 45 | 45 | |
| 21 | Thermodynamics | PLO 3. Mastery of the theoretical concepts of classical and modern physics, the principles and applications of | 8 | 24 | 90/45=2 credits |
| | | | 8 | | |
| | | | 8 | | |



| Course No. | Course Name | PLO Assigned to the Course | Duration required to achieve PLO (in hours / SKS) | Total (in hours / ECTS) | Conversion to SKS |
|------------|--------------------------------------|--|---|-------------------------|-------------------|
| (1) | (2) | (3) | (4) | (5) | (6) |
| | | mathematics, computation and physics instrumentation, as well as operational knowledge of the instruments and software used in the field of physics and its teaching. | 8 | 24 | |
| | | | 8 | | |
| | | | 8 | 24 | |
| | | | 8 | | |
| | | | 8 | | |
| | | PLO 5. Able to apply concepts of classical and modern physics, mathematics, and instrumentation and software technology to analyse and solve physics problems accurately and systematically. | 18 | 18 | |
| 22 | Basic Electronics | PLO 3. Mastery of the theoretical concepts of classical and modern physics, the principles and applications of mathematics, computation and physics instrumentation, as well as operational knowledge of the instruments and software used in the field of physics and its teaching. | 18 | 32 | 90/45=2 credits |
| | | | 18 | | |
| | | | 18 | 32 | |
| | | | 18 | | |
| | | PLO 5. Able to apply concepts of classical and modern physics, mathematics, and instrumentation and software technology to analyse and solve physics problems accurately and systematically. | 26 | 26 | |
| 23 | Introduction to Mathematical Physics | PLO 3. Mastery of the theoretical concepts of classical and modern physics, the principles and applications of mathematics, computation and physics instrumentation, as well as operational knowledge of the instruments and software used in the field of physics and its teaching. | 40 | 40 | 135/45 = 3 ECTS |
| | | | 60 | 60 | |
| | | PLO 5. Able to apply concepts of classical and modern physics, mathematics, and instrumentation and software technology to analyse and solve physics problems accurately and systematically. | 35 | 35 | |
| 24 | Computer Programming | PLO 3. Mastery of the theoretical concepts of classical and modern physics, | 15 | 45 | 90/45=2 credits |
| | | | 15 | | |



| Course No. | Course Name | PLO Assigned to the Course | Duration required to achieve PLO (in hours / SKS) | Total (in hours / ECTS) | Conversion to SKS |
|------------|----------------------------------|--|---|---|-------------------|
| (1) | (2) | (3) | (4) | (5) | (6) |
| | | the principles and applications of mathematics, computation and physics instrumentation, as well as operational knowledge of the instruments and software used in the field of physics and its teaching. | 15 | | |
| | | PLO 5. Able to apply concepts of classical and modern physics, mathematics, and instrumentation and software technology to analyse and solve physics problems accurately and systematically. | 15 | 45 | |
| | | | 15 | | |
| | | | 15 | | |
| 25 | Classical Mechanics | PLO 3. Mastery of the theoretical concepts of classical and modern physics, the principles and applications of mathematics, computation and physics instrumentation, as well as operational knowledge of the instruments and software used in the field of physics and its teaching. | 30 | 60 | 90/45=2 credits |
| | | | 30 | | |
| | | PLO 5. Able to apply concepts of classical and modern physics, mathematics, and instrumentation and software technology to analyse and solve physics problems accurately and systematically. | 30 | 30 | |
| 26 | Physics Learning and Instruction | PLO 2. Understanding educational theory and learner development, research methodology in physics education, as well as the principles, methods and techniques of contextual physics learning utilising ICT. | 9 | 27 | 154 = 3 credits |
| | | | 9 | | |
| | | | 9 | | |
| | | | 9 | 27 | |
| | | | 9 | | |
| | | | 9 | | |
| | | | 9 | 27 | |
| | | | 9 | | |
| | | 9 | | | |
| | | | | PLO 7. Able to make appropriate decisions based on the analysis of information and data in the field of physics education, and able to provide guidance on selecting various alternative solutions, both independently and in groups. | |
| | | | 30 | | |
| 27 | Basic Statistics | PLO 2. Understanding educational theory | 6 | 18 | 94 = 2 |



| Course No. | Course Name | PLO Assigned to the Course | Duration required to achieve PLO (in hours / SKS) | Total (in hours / ECTS) | Conversion to SKS |
|------------|---------------------------|---|---|-------------------------|--------------------|
| (1) | (2) | (3) | (4) | (5) | (6) |
| | | and learner development, research methodology in physics education, as well as the principles, methods and techniques of contextual physics learning utilising ICT. | 6 | | credits |
| | | | 6 | | |
| | | | 6 | 18 | |
| | | | 6 | | |
| | | | 6 | | |
| | | | 6 | 18 | |
| | | | 6 | | |
| | | | 6 | | |
| | | PLO 4. Able to design, implement, manage and evaluate secondary school physics teaching independently and innovatively using a scientific approach, based on <i>pedagogical content knowledge</i> and instructional design principles, as well as effectively utilising science and technology and learning resources (including laboratories) to develop students' scientific thinking skills. | 20 | 40 | |
| | | | 20 | | |
| 28 | Mathematics and Physics | PLO 3. Mastery of the theoretical concepts of classical and modern physics, the principles and applications of mathematics, computation and physics instrumentation, as well as operational knowledge of the instruments and software used in the field of physics and its teaching. | 27 | 54 | 135/45 = 3 ECTS |
| | | | 27 | | |
| | | | 27 | 54 | |
| | | | 27 | | |
| | | PLO 5. Able to apply concepts of classical and modern physics, mathematics, and instrumentation and software technology to analyse and solve physics problems accurately and systematically. | 13 | 27 | |
| | | | 14 | | |
| 29 | Electricity and Magnetism | PLO 3. Mastery of the theoretical concepts of classical and modern physics, the principles and applications of mathematics, computation and physics instrumentation, as well as operational knowledge of the instruments and software used in the field of physics and its teaching. | 27 | 54 | 135/45 = 3 credits |
| | | | 27 | | |
| | | | 27 | 54 | |
| | | | 27 | | |
| | | PLO 5. Able to apply concepts of | 13 | 27 | |



| Course No. | Course Name | PLO Assigned to the Course | Duration required to achieve PLO (in hours / SKS) | Total (in hours / ECTS) | Conversion to SKS |
|------------|---------------------------------------|--|---|-------------------------|-----------------------|
| (1) | (2) | (3) | (4) | (5) | (6) |
| | | classical and modern physics, mathematics, and instrumentation and software technology to analyse and solve physics problems accurately and systematically. | 14 | | |
| 30 | Computational Physics | PLO 3. Mastery of the theoretical concepts of classical and modern physics, the principles and applications of mathematics, computation and physics instrumentation, as well as operational knowledge of the instruments and software used in the field of physics and its teaching. | 30 | 60 | 90/45=2 credits |
| | | | 30 | | |
| | | PLO 5. Able to apply concepts of classical and modern physics, mathematics, and instrumentation and software technology to analyse and solve physics problems accurately and systematically. | 30 | 30 | |
| 31 | Basic Electronics Practicum | PLO 3. Mastery of the theoretical concepts of classical and modern physics, the principles and applications of mathematics, computation and physics instrumentation, as well as operational knowledge of the instruments and software used in the field of physics and its teaching. | 5 | 5 | 45/45 = 1 credit |
| | | | 20 | 40 | |
| | | PLO 5. Able to apply concepts of classical and modern physics, mathematics, and instrumentation and software technology to analyse and solve physics problems accurately and systematically. | 20 | | |
| 32 | 10th Grade Senior High School Physics | PLO 2. Understanding educational theory and learner development, research methodology in physics education, as well as the principles, methods and techniques of contextual physics learning utilising ICT. | 10 | 30 | 152 hours = 3 credits |
| | | | 10 | | |
| | | | 10 | | |
| | | PLO 7. Able to make appropriate decisions based on the analysis of information and data in the field of physics education, and able to provide | 10 | 32 | |
| | | | 10 | | |
| | 12 | | | | |
| | 20 | 60 | | | |



| Course No. | Course Name | PLO Assigned to the Course | Duration required to achieve PLO (in hours / SKS) | Total (in hours / ECTS) | Conversion to SKS |
|------------|---------------------------------|--|---|-------------------------|--------------------|
| (1) | (2) | (3) | (4) | (5) | (6) |
| | | guidance in selecting various alternative solutions, both independently and in groups. | 20 | | |
| | | PLO 8. Responsible for group work in the field of physics education. | 10 | 30 | |
| | | | 20 | | |
| 33 | English for Physics Instruction | PLO 2. Understanding educational theory and learner development, research methodology in physics education, as well as the principles, methods and techniques of contextual physics learning utilising ICT. | 6 | 22 | 106/45 = 2 credits |
| | | | 6 | | |
| | | | 10 | | |
| | | | 6 | 18 | |
| | | | 6 | | |
| | | | 6 | | |
| | | PLO 7. Able to make appropriate decisions based on the analysis of information and data in the field of physics education, and able to provide guidance in selecting various alternative solutions, both independently and in groups. | 6 | 26 | |
| | | | 10 | | |
| | | | 10 | | |
| | | PLO 8. Responsible for group work in the field of physics education. | 20 | 40 | |
| | | | 20 | | |
| 34 | Multi-Body Systems Mechanics | PLO 3. Mastery of the theoretical concepts of classical and modern physics, the principles and applications of mathematics, computation and physics instrumentation, as well as operational knowledge of the instruments and software used in the field of physics and its teaching. | 25 | 50 | 90/45=2 credits |
| | | | 25 | | |
| | | | 25 | 25 | |
| | | | | | |
| | | PLO 5. Able to apply concepts of classical and modern physics, mathematics, and instrumentation and software technology to analyse and solve physics problems accurately and systematically. | 15 | 15 | |
| 35 | Modern Physics | PLO 3. Mastery of the theoretical concepts of classical and modern physics, the principles and applications of mathematics, computation and physics instrumentation, as well as operational knowledge of the instruments and software used in the field of physics and its teaching. | 12 | 36 | 135/45 = 3 ECTS |
| | | | 12 | | |
| | | | 12 | | |
| | | | 12 | 36 | |
| | | | 12 | | |
| | | | 12 | | |
| | | | 12 | 36 | |
| | | | 12 | | |



| Course No. | Course Name | PLO Assigned to the Course | Duration required to achieve PLO (in hours / SKS) | Total (in hours / ECTS) | Conversion to SKS |
|------------|-------------------------|--|---|-------------------------|-------------------------|
| (1) | (2) | (3) | (4) | (5) | (6) |
| | | | 12 | | |
| | | PLO 5. Able to apply concepts of classical and modern physics, mathematics, and instrumentation and software technology to analyse and solve physics problems accurately and systematically. | 15 | 27 | |
| | | | 12 | | |
| 36 | Physics Learning Design | PLO 2. Understanding educational theory and learner development, research methodology in physics education, as well as the principles, methods and techniques of contextual physics learning utilising ICT. | 12 | 36 | 156 hours = 3 credits |
| | | | 12 | | |
| | | | 12 | | |
| | | PLO 4. Designing, implementing and evaluating physics teaching in an innovative and scientific manner. | 12 | 44 | |
| | | | 20 | | |
| | | | 12 | | |
| | | PLO 7. Able to make appropriate decisions based on the analysis of information and data in the field of physics education, and able to provide guidance in selecting various alternative solutions, both independently and in groups. | 12 | 36 | |
| | | | 12 | | |
| | | PLO 8. Responsible for group work in the field of physics education. | 20 | 20 | |
| 37 | Waves and Optics | PLO 3. Mastery of the theoretical concepts of classical and modern physics, the principles and applications of mathematics, computation and physics instrumentation, as well as operational knowledge of the instruments and software used in the field of physics and its teaching. | 13 | 39 | 135/45 = 3 ECTS credits |
| | | | 13 | | |
| | | | 13 | | |
| | | | 13 | 39 | |
| | | | 13 | | |
| | | | 13 | | |
| | | | 13 | 26 | |
| | | | 14 | | |
| | | PLO 5. Able to apply concepts of classical and modern physics, mathematics, and instrumentation and software technology to analyse and solve physics problems accurately and systematically. | 15 | 30 | |
| | | | 15 | | |
| 38 | Digital Electronics | PLO 3. Mastery of the theoretical | 25 | 50 | 90/45=2 |



| Course No. | Course Name | PLO Assigned to the Course | Duration required to achieve PLO (in hours / SKS) | Total (in hours / ECTS) | Conversion to SKS |
|------------|---------------------------------------|--|---|-------------------------|-------------------|
| (1) | (2) | (3) | (4) | (5) | (6) |
| | | concepts of classical and modern physics, the principles and applications of mathematics, computation and physics instrumentation, as well as operational knowledge of the instruments and software used in the field of physics and its teaching. | 25 | | credits |
| | | PLO 5. Able to apply concepts of classical and modern physics, mathematics, and instrumentation and software technology to analyse and solve physics problems accurately and systematically. | 20 | 40 | |
| | | | 20 | | |
| 39 | 11th Grade Senior High School Physics | PLO 2. Understanding educational theory and learner development, research methodology in physics education, as well as the principles, methods and techniques of contextual physics learning utilising ICT. | 6 | 18 | 96/45 = 2 credits |
| | | | 6 | | |
| | | | 6 | | |
| | | | 6 | 18 | |
| | | | 6 | | |
| | | | 6 | | |
| | | PLO 7. Able to make appropriate decisions based on the analysis of information and data in the field of physics education, and able to provide guidance in selecting various alternative solutions, both independently and in groups. | 8 | 24 | |
| | | | 8 | | |
| | | | 8 | | |
| | | PLO 8. Responsible for the field of physics education and may be entrusted with responsibility for the achievement of group work outcomes. | 9 | 36 | |
| | | | 9 | | |
| | | | 9 | | |
| 9 | | | | | |
| 40 | Statistical Physics | PLO 3. Mastery of the theoretical concepts of classical and modern physics, the principles and applications of mathematics, computation and physics instrumentation, as well as operational knowledge of the instruments and software used in the field of physics and its teaching. | 30 | 30 | 90/45=2 credits |
| | | | 30 | 30 | |



| Course No. | Course Name | PLO Assigned to the Course | Duration required to achieve PLO (in hours / SKS) | Total (in hours / ECTS) | Conversion to SKS |
|--|--------------------------------------|--|---|-------------------------|--------------------|
| (1) | (2) | (3) | (4) | (5) | (6) |
| | | PLO 5. Able to apply concepts of classical and modern physics, mathematics, and instrumentation and software technology to analyse and solve physics problems accurately and systematically. | 30 | 30 | |
| 41 | Applied Physics | PLO 3. Mastery of the theoretical concepts of classical and modern physics, the principles and applications of mathematics, computation and physics instrumentation, as well as operational knowledge of the instruments and software used in the field of physics and its teaching. | 45 | 45 | 90/45 = 2 ECTS |
| | | PLO 5. Able to apply concepts of classical and modern physics, mathematics, and instrumentation and software technology to analyse and solve physics problems accurately and systematically. | 45 | 45 | |
| 42 | Philosophy of Science | PLO 2. Understanding educational theory and learner development, research methodology in physics education, as well as the principles, methods and techniques of contextual physics learning utilising ICT. | 6 | 18 | 94/45 = 2 credits |
| | | | 6 | | |
| | | | 6 | | |
| | | | 6 | 18 | |
| | | | 6 | | |
| | | PLO 7. Able to make appropriate decisions based on the analysis of information and data in the field of physics education, and able to provide guidance on selecting various alternative solutions, both independently and in groups. | 6 | 18 | |
| | | | 6 | | |
| PLO 8. Responsible for the field of physics education and may be entrusted with responsibility for the achievement of group work outcomes. | 20 | 40 | | | |
| | 20 | | | | |
| 43 | Physics Learning Media and Materials | PLO 2. Understanding educational theory and learner development, research methodology in physics education, as well as the principles, methods and techniques of contextual physics learning utilising ICT. | 15 | 70 | 185/45 = 4 credits |
| | | | 15 | | |
| | | | 20 | | |



| Course No. | Course Name | PLO Assigned to the Course | Duration required to achieve PLO (in hours / SKS) | Total (in hours / ECTS) | Conversion to SKS |
|------------|-----------------------------|--|---|-------------------------|--------------------|
| (1) | (2) | (3) | (4) | (5) | (6) |
| | | PLO 7. Able to make appropriate decisions based on the analysis of information and data in the field of physics education, and able to provide guidance in selecting various alternative solutions, both independently and in groups. | 15 15 15 | 45 | |
| | | PLO 8. Responsible for the field of physics education and may be entrusted with responsibility for the achievement of group work outcomes. | 20 20 20 | 60 | |
| | | PLO 9. Able to creatively and contextually develop innovative technology-based multimedia learning materials, and manage educational products as a form of entrepreneurship in the field of education. | 10 20 | 30 | |
| 44 | Physics Learning Strategies | PLO 2. Understanding educational theory and learner development, research methodology in physics education, as well as the principles, methods and techniques of contextual physics learning utilising ICT. | 9 9 9 | 27 | 141/45 = 3 credits |
| | | PLO 4. Able to design, implement, manage and evaluate secondary school physics teaching independently and innovatively using a scientific approach, based on pedagogical content knowledge and instructional design principles, as well as effectively utilising science and technology and learning resources (including laboratories) to develop students' scientific thinking skills. | 9 9 9 | 27 | |
| | | PLO 7. Able to make appropriate decisions based on the analysis of information and data in the field of physics education, and able to provide guidance in selecting various alternative solutions, both independently and in groups. | 9 9 9 | 27 | |
| | | PLO 8. Responsible for the field of | 30 | 60 | |



| Course No. | Course Name | PLO Assigned to the Course | Duration required to achieve PLO (in hours / SKS) | Total (in hours / ECTS) | Conversion to SKS |
|------------|-------------------------------|--|---|-------------------------|------------------------|
| (1) | (2) | (3) | (4) | (5) | (6) |
| | | physics education and may be entrusted with responsibility for the achievement of group work outcomes. | 30 | | |
| 45 | Research Methodology | PLO 2. Understanding educational theory and learner development, research methodology in physics education, as well as the principles, methods and techniques of contextual physics learning utilising ICT. | 10 | 30 | 130/45 = 3 credits |
| | | | 10 | | |
| | | | 10 | | |
| | | PLO 7. Able to make appropriate decisions based on the analysis of information and data in the field of physics education, and able to provide guidance in selecting various alternative solutions, both independently and in groups. | 10 | 20 | |
| | | | 10 | | |
| | | | 10 | 40 | |
| | | | 15 | | |
| | | PLO 8. Responsible for the field of physics education and may be entrusted with responsibility for the achievement of group work outcomes. | 15 | | |
| 20 | 40 | | | | |
| 46 | Digital Electronics Practicum | PLO 3. Mastery of the theoretical concepts of classical and modern physics, the principles and applications of mathematics, computation and physics instrumentation, as well as operational knowledge of the instruments and software used in the field of physics and its teaching. | 5 | 5 | 45/45=1 credit |
| | | | 20 | 40 | |
| | | PLO 5. Able to apply concepts of classical and modern physics, mathematics, and instrumentation and software technology to analyse and solve physics problems accurately and systematically. | 20 | | |
| 47 | Nuclear Physics | PLO 3. Mastery of the theoretical concepts of classical and modern physics, the principles and applications of mathematics, computation and physics instrumentation, as well as operational knowledge of the instruments and software used in the field of physics and its teaching. | 8 | 24 | 90/45 = 2 ECTS credits |
| | | | 8 | | |
| | | | 8 | | |
| | | | 8 | 24 | |
| | | | 8 | | |
| | | | 8 | | |
| | | | 8 | 24 | |
| | | | 8 | | |



| Course No. | Course Name | PLO Assigned to the Course | Duration required to achieve PLO (in hours / SKS) | Total (in hours / ECTS) | Conversion to SKS |
|------------|-----------------------------------|--|---|-------------------------|------------------------|
| (1) | (2) | (3) | (4) | (5) | (6) |
| | | | 8 | | |
| | | PLO 5. Able to apply concepts of classical and modern physics, mathematics, and instrumentation and software technology to analyse and solve physics problems accurately and systematically. | 9 | 18 | |
| | | | 9 | | |
| 48 | Physics Experiments | PLO 3 Mastery of theoretical concepts in classical and modern physics, principles and applications of mathematics, computation, and physics instrumentation, as well as operational knowledge of the instruments and software used in the field of physics and its teaching. | 45 | 45 | 90/45=2 credits |
| | | PLO 5. Able to apply concepts of classical and modern physics, mathematics, and instrumentation and software technology to analyse and solve physics problems accurately and systematically. | 45 | 45 | |
| 49 | Introduction to Quantum Mechanics | PLO 3. Mastery of the theoretical concepts of classical and modern physics, the principles and applications of mathematics, computation and physics instrumentation, as well as operational knowledge of the instruments and software used in the field of physics and its teaching. | 8 | 24 | 90/45 = 2 ECTS credits |
| | | | 8 | | |
| | | | 8 | | |
| | | | 8 | 24 | |
| | | | 8 | | |
| | | | 8 | | |
| | | | 8 | 24 | |
| | | | 8 | | |
| | | | 8 | | |
| | | PLO 5. Able to apply concepts of classical and modern physics, mathematics, and instrumentation and software technology to analyse and solve physics problems accurately and systematically. | 9 | 18 | |
| | | | 9 | | |
| 50 | Solid-State Physics | PLO 3. Mastery of the theoretical concepts of classical and modern physics, the principles and applications of mathematics, computation and physics instrumentation, as well as operational | 8 | 24 | 90/45 = 2 credits |
| | | | 8 | | |
| | | | 8 | | |
| | | | 8 | 24 | |
| | | | 8 | | |



| Course No. | Course Name | PLO Assigned to the Course | Duration required to achieve PLO (in hours / SKS) | Total (in hours / ECTS) | Conversion to SKS |
|------------|---|--|---|-------------------------|-------------------|
| (1) | (2) | (3) | (4) | (5) | (6) |
| | | knowledge of the instruments and software used in the field of physics and its teaching. | 8 | | |
| | | | 8 | 24 | |
| | | | 8 | | |
| | | | 8 | | |
| | | PLO 5. Able to apply concepts of classical and modern physics, mathematics, and instrumentation and software technology to analyse and solve physics problems accurately and systematically. | 9 | 18 | |
| | | | 9 | | |
| 51 | Physics Education Laboratory | PLO 2. Understanding educational theory and learner development, research methodology in physics education, as well as the principles, methods and techniques of contextual physics learning utilising ICT. | 9 | 28 | 97/45 = 2 credits |
| | | | 9 | | |
| | | | 10 | | |
| | | PLO 4. Able to design, implement, manage and evaluate secondary school physics teaching independently and innovatively using a scientific approach, grounded in <i>pedagogical content knowledge</i> and instructional design principles, and effectively utilising science, technology, engineering and mathematics (STEM) and learning resources (including laboratories) to develop students' scientific thinking skills. | 9 | 39 | |
| | | | 20 | | |
| | | | 10 | | |
| | | PLO 8. Demonstrates a sense of responsibility, teamwork and professional ethics in the performance of duties in the field of physics education. | 10 | 30 | |
| | | | 10 | | |
| | | | 10 | | |
| 52 | Evaluation of Learning Process and Outcomes | PLO 2. Understanding educational theory and learner development, research methodology in physics education, as well as the principles, methods and techniques of contextual physics learning utilising ICT. | 9 | 27 | 153 = 3 credits |
| | | | 9 | | |
| | | | 9 | | |
| | | PLO 4. Designing, implementing and evaluating physics teaching in an innovative and scientific manner. | 9 | 45 | |
| | | | 18 | | |
| | | | 18 | | |
| | | PLO 7. Able to make appropriate | 9 | 45 | |



| Course No. | Course Name | PLO Assigned to the Course | Duration required to achieve PLO (in hours / SKS) | Total (in hours / ECTS) | Conversion to SKS | |
|------------|--|---|---|-------------------------|--------------------|--------------------|
| (1) | (2) | (3) | (4) | (5) | (6) | |
| | | decisions based on the analysis of information and data in the field of physics education, and able to provide guidance in selecting various alternative solutions, both independently and in groups. | 18 18 | | | |
| | | PLO 8. Demonstrates a sense of responsibility, teamwork and professional ethics in the performance of duties in the field of physics education. | 18 18 | 36 | | |
| 53 | Scientific Publications in Physics Education | PLO 1. Able to demonstrate character and conduct that reflect adaptability, enthusiasm and integrity as an expression of devotion to God Almighty. | 9 9 | 18 | 105/45 = 2 credits | |
| | | PLO 2. Understanding educational theory and learner development, research methodology in physics education, as well as the principles, methods and techniques of contextual physics learning utilising ICT. | 9 10 | 19 | | |
| | | PLO 6. Able to conduct research and scientific studies in the field of physics education as an alternative problem-solving approach to produce published scientific papers. | 10 9 9 | 28 | | |
| | | PLO 7. Able to make appropriate decisions based on the analysis of information and data in the field of physics education, and able to provide guidance in selecting various alternative solutions, both independently and in groups. | 10 10 | 20 | | |
| | | PLO 8. Demonstrates a sense of responsibility, teamwork and professional ethics in carrying out duties in the field of physics education. | 10 10 | 20 | | |
| 54 | Final Project Proposal Seminar | PLO 2. Understanding educational theory and learner development, research methodology in physics education, as well as the principles, methods and techniques of contextual physics learning utilising ICT. | 10 10 10 | 30 | | 110/45 = 2 credits |
| | | PLO 6. Able to conduct research and | 20 | 80 | | |



| Course No. | Course Name | PLO Assigned to the Course | Duration required to achieve PLO (in hours / SKS) | Total (in hours / ECTS) | Conversion to SKS |
|---|--------------------------------|--|---|-------------------------|--------------------|
| (1) | (2) | (3) | (4) | (5) | (6) |
| | | scientific studies in the field of physics education as an alternative problem-solving approach to produce published scientific papers. | 30 30 | | |
| 55 | Microteaching | PLO 1. Able to demonstrate character and conduct that reflect adaptability, enthusiasm and integrity as an expression of devotion to God the Almighty | 2 | 6 | 110/45 = 2 credits |
| | | | 2 | | |
| | | | 2 | | |
| | | PLO 2. Understanding educational theory and learner development, research methodology in physics education, as well as the principles, methods and techniques of contextual physics learning utilising ICT. | 10 | 20 | |
| | | | 10 | | |
| | | PLO 4. Able to design, implement, manage, and evaluate secondary school physics teaching independently and innovatively using a scientific approach, based on <i>pedagogical content knowledge</i> and instructional design principles, and effectively utilising science and technology as well as learning resources (including laboratories) to develop students' scientific thinking skills. | 10 | 80 | |
| | | | | | |
| | | | 10 | | |
| | | | | | |
| | | | 10 | | |
| | | | | | |
| | | | 10 | | |
| | | | | | |
| | | | 10 | | |
| | | | | | |
| PLO 8. Demonstrates a sense of responsibility, teamwork and professional ethics in the performance of duties in the field of physics education. | 2 | 4 | | | |
| | 2 | | | | |
| 56 | Internship-Curriculum Analysis | PLO 1. Able to demonstrate character and conduct that reflect adaptability, enthusiasm and integrity as an expression of devotion to God Almighty. | 10 | 10 | 90/45 = 2 credits |



| Course No. | Course Name | PLO Assigned to the Course | Duration required to achieve PLO (in hours / SKS) | Total (in hours / ECTS) | Conversion to SKS |
|------------|--------------------------------------|--|---|-------------------------|-------------------|
| (1) | (2) | (3) | (4) | (5) | (6) |
| | | PLO 2. Understanding educational theory and learner development, research methodology in physics education, as well as the principles, methods and techniques of contextual physics learning utilising ICT. | 20 | 20 | |
| | | PLO 4. Able to design, implement, manage, and evaluate secondary school physics teaching independently and innovatively using a scientific approach, based on <i>pedagogical content knowledge</i> and instructional design principles, and effectively utilising science and technology as well as learning resources (including laboratories) to develop students' scientific thinking skills. | 20 | 40 | |
| | | | 20 | | |
| | | PLO 7. Able to make appropriate decisions based on the analysis of information and data in the field of physics education, and able to provide guidance in selecting various alternative solutions, both independently and in groups. | 20 | 20 | |
| 57 | Internship – Lesson Plan Development | PLO 1. Able to demonstrate character and conduct that reflect adaptability, enthusiasm and integrity as an expression of devotion to God Almighty. | 10 | 10 | 90/45 = 2 credits |
| | | PLO 2. Understanding educational theory and learner development, research methodology in physics education, as well as the principles, methods, and techniques of contextual physics learning utilising ICT. | 20 | 40 | |
| | | | 20 | | |
| | | PLO 4. Able to design, implement, manage, and evaluate secondary school physics teaching independently and innovatively using a scientific approach, based on <i>pedagogical content knowledge</i> and instructional design principles, and effectively utilising science and technology and learning resources (including laboratories) to develop students' scientific thinking skills. | 20 | 20 | |



| Course No. | Course Name | PLO Assigned to the Course | Duration required to achieve PLO (in hours / SKS) | Total (in hours / ECTS) | Conversion to SKS |
|--|---|---|---|-------------------------|--------------------|
| (1) | (2) | (3) | (4) | (5) | (6) |
| | | PLO 7. Able to make appropriate decisions based on the analysis of information and data in the field of physics education and able to provide guidance in selecting various alternative solutions, both independently and in groups. | 20 | 20 | |
| 58 | Internship – Learning Media Development | PLO 1. Able to demonstrate character and conduct that reflect adaptability, enthusiasm and integrity as an expression of devotion to God Almighty. | 10 | 10 | 95/45 = 2 credits |
| | | PLO 2. Understanding educational theory and learner development, research methodology in physics education, as well as the principles, methods and techniques of contextual physics learning utilising ICT. | 20 | 55 | |
| | | | 20 | | |
| | | | 15 | | |
| | | PLO 4. Able to design, implement, manage and evaluate secondary school physics teaching independently and innovatively using a scientific approach, based on <i>pedagogical content knowledge</i> and instructional design principles, as well as utilising science and technology and learning resources (including laboratories) effectively to develop students' scientific thinking skills. | 15 | 15 | |
| PLO 7. Able to make appropriate decisions based on the analysis of information and data in the field of physics education and able to provide guidance in selecting various alternative solutions, both independently and in groups. | 15 | 15 | | | |
| 59 | Internship - Teaching Practice | PLO 1. Able to demonstrate character and conduct that reflect adaptability, enthusiasm and integrity as an expression of devotion to God Almighty. | 10 | 30 | 180/45 = 4 credits |
| | | | 10 | | |
| | | | 10 | | |
| | | PLO 2. Understanding educational theory and learner development, research methodology in physics education, as | 25 | 100 | |
| | | | 25 | | |
| | | | 25 | | |



| Course No. | Course Name | PLO Assigned to the Course | Duration required to achieve PLO (in hours / SKS) | Total (in hours / ECTS) | Conversion to SKS |
|------------|--|---|---|-------------------------|--------------------|
| (1) | (2) | (3) | (4) | (5) | (6) |
| | | well as the principles, methods, and techniques of contextual physics learning utilising ICT. | 25 | | |
| | | PLO 4. Able to design, implement, manage and evaluate secondary school physics teaching independently and innovatively using a scientific approach, based on <i>pedagogical content knowledge</i> and instructional design principles, as well as utilising science and technology and learning resources (including laboratories) effectively to develop students' scientific thinking skills. | 25 | 25 | |
| | | PLO 7. Able to make appropriate decisions based on the analysis of information and data in the field of physics education and able to provide guidance in selecting various alternative solutions, both independently and in groups. | 25 | 25 | |
| 60 | PCB Design | PLO 3. Mastery of the theoretical concepts of classical and modern physics, the principles and applications of mathematics, computation and physics instrumentation, as well as operational knowledge of the instruments and software used in the field of physics and its teaching. | 60 | 60 | 135/45 = 3 ECTS |
| | | PLO 10. Able to independently <i>develop</i> prototype electronics-based systems or products and <i>software</i> . | 75 | 75 | |
| 61 | Multimedia Project Design and Research | PLO 2. Understanding educational theory and learner development, research methodology in physics education, as well as the principles, methods and techniques of contextual physics learning utilising ICT. | 20 25 | 45 | 135/45 = 3 credits |
| | | PLO 9. Able to creatively and contextually develop innovative technology-based multimedia learning materials, and manage educational products as a form of entrepreneurship in the field of education. | 20 25 20 25 | 90 | |



| Course No. | Course Name | PLO Assigned to the Course | Duration required to achieve PLO (in hours / SKS) | Total (in hours / ECTS) | Conversion to SKS |
|------------|---|--|---|-------------------------|--------------------|
| (1) | (2) | (3) | (4) | (5) | (6) |
| 62 | Embedded Systems Programming | PLO 3. Mastery of the theoretical concepts of classical and modern physics, the principles and applications of mathematics, computation and physics instrumentation, as well as operational knowledge of the instruments and software used in the field of physics and its teaching. | 60 | 60 | 135/45 = 3 ECTS |
| | | PLO 10. Able to independently <i>develop</i> prototype electronics-based systems or products and <i>software</i> . | 75 | 75 | |
| 63 | Digital Visual Development and Storytelling | PLO 2. Understanding educational theory and learner development, research methodology in physics education, as well as the principles, methods, and techniques of contextual physics learning utilising ICT. | 45 | 45 | 135/45 = 3 credits |
| | | PLO 9. Able to creatively and contextually develop innovative technology-based multimedia learning resources, and manage educational products as a form of entrepreneurship in the field of education. | 90 | 90 | |
| 64 | System Interfacing | PLO 3. Mastery of the theoretical concepts of classical and modern physics, the principles and applications of mathematics, computation and physics instrumentation, as well as operational knowledge of the instruments and software used in the field of physics and its teaching. | 15 | 15 | 90/45 = 2 credits |
| | | PLO 10. Able to <i>develop</i> prototype electronics-based systems or products and <i>software</i> independently. | 15 | 35 | |
| | | | 20 | | |
| | | | 20 | 40 | |
| 20 | | | | | |
| 65 | Multimedia Asset Design and Production | PLO 2. Understanding educational theory and learner development, research methodology in physics education, as well as the principles, methods, and techniques of contextual physics learning utilising ICT. | 60 | 60 | 90/45 = 2 credits |



| Course No. | Course Name | PLO Assigned to the Course | Duration required to achieve PLO (in hours / SKS) | Total (in hours / ECTS) | Conversion to SKS |
|------------|--|--|---|-------------------------|--------------------|
| (1) | (2) | (3) | (4) | (5) | (6) |
| | | PLO 9. Able to creatively and contextually develop innovative technology-based multimedia learning resources, and manage educational products as a form of entrepreneurship in the field of education. | 30 | 30 | |
| 66 | Robotics | PLO 3. Mastery of the theoretical concepts of classical and modern physics, the principles and applications of mathematics, computation and physics instrumentation, as well as operational knowledge of the instruments and software used in the field of physics and its teaching. | 10 | 30 | 90/45 = 2 credits |
| | | | 10 | | |
| | | | 10 | | |
| | | PLO 10. Able to independently <i>develop</i> prototype electronics-based systems or products and <i>software</i> . | 10 | 30 | |
| | | | 10 | | |
| | | | 10 | | |
| 67 | Audio-Visual Integration in Multimedia | PLO 2. Understanding educational theory and learner development, research methodology in physics education, as well as the principles, methods and techniques of contextual physics teaching using ICT. | 30 | 30 | 90/45 = 2 credits |
| | | PLO 9. Able to creatively and contextually develop innovative technology-based multimedia learning resources, and manage educational products as a form of entrepreneurship in the field of education. | 60 | 60 | |
| 68 | Final Project | PLO 2. Understanding educational theory and learner development, research methodology in physics education, as well as the principles, methods, and techniques of contextual physics learning utilising ICT. | 60 | 280 | 280/45 = 6 credits |
| | | | 60 | | |
| | | PLO 6. Able to conduct research and scientific studies in the field of physics education and physics as an alternative approach to problem-solving, resulting in published scientific papers. | 80 | | |
| | | | 80 | | |
| | | | | | |

Table 6.4 PLO - Course Mapping Matrix



| No | Course Name | PLO | | | | | | | | | | |
|------------|---|-----|---|---|---|---|---|---|---|---|----|----|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| Semester 1 | | | | | | | | | | | | |
| 1 | Islamic Religious Education | √ | | | | | | | | | | √ |
| | Christian Religious Education | √ | | | | | | | | | | √ |
| | Catholic Religious Education | √ | | | | | | | | | | √ |
| | Buddhist Religious Education | √ | | | | | | | | | | √ |
| | Hindu Religious Education | √ | | | | | | | | | | √ |
| | Confucian Religious Education | √ | | | | | | | | | | √ |
| 2 | Civics Education | √ | | | | | | | | | | √ |
| 3 | PGRI Studies | √ | | | | | | | | | | √ |
| 4 | Foundations of Education | | √ | | √ | | | | | | | |
| 5 | Student Development | | √ | | √ | | | | √ | | | |
| 6 | General Biology | | | √ | | √ | | | | | | |
| 7 | Basic Chemistry | | | √ | | √ | | | | | | |
| 8 | Calculus | | | √ | | √ | | | | | | |
| 9 | Basic Physics: Mechanics and Thermodynamics | | | √ | | √ | | | | | | |
| Semester 2 | | | | | | | | | | | | |
| 1 | Pancasila Education | √ | | | | | | | | | | √ |
| 2 | Indonesian Language | √ | | | | | | | | | | √ |
| 3 | English | √ | | | | | | | | | | √ |
| 4 | Basic Physics: Electromagnetism | | | √ | | √ | | | | | | |
| 5 | Thermodynamics | | | √ | | √ | | | | | | |
| 6 | Basic Electronics | | | √ | | √ | | | | | | |
| 7 | Introduction to Mathematics for Physics | | | √ | | √ | | | | | | |
| 8 | Computer Programming | | | √ | | √ | | | | | | |
| Semester 3 | | | | | | | | | | | | |
| 1 | Classical Mechanics | | | √ | | √ | | | | | | |
| 2 | Physics Learning and Instructions | | √ | | | | | √ | | | | |
| 3 | Basic Statistics | | √ | | √ | | | | | | | |
| 4 | Mathematical Physics | | | √ | | √ | | | | | | |
| 5 | Electricity and Magnetism | | | √ | | √ | | | | | | |
| 6 | Computational Physics | | | √ | | √ | | | | | | |
| 7 | Basic Electronics Practicum | | | √ | | √ | | | | | | |
| 8 | 10th Grade Senior High School Physics | | √ | | | | | √ | √ | | | |
| 9 | English for Physics Instruction | | √ | | | | | √ | √ | | | |
| Semester 4 | | | | | | | | | | | | |
| 1 | Multi-Body Systems Mechanics | | | √ | | √ | | | | | | |



| No | Course Name | PLO | | | | | | | | | | |
|------------|---|-----|---|---|---|---|---|---|---|---|----|----|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 2 | Modern Physics | | | √ | | √ | | | | | | |
| 3 | Physics Learning Design | | √ | | √ | | | √ | √ | | | |
| 4 | Waves and Optics | | | √ | | √ | | | | | | |
| 5 | Digital Electronics | | | √ | | √ | | | | | | |
| 6 | 11th Grade Senior High School Physics | | √ | | | | | √ | √ | | | |
| 7 | Statistical Physics | | | √ | | √ | | | | | | |
| 8 | Applied Physics | | | √ | | √ | | | | | | |
| 9 | Philosophy of Science | | √ | | | | | √ | √ | | | |
| Semester 5 | | | | | | | | | | | | |
| 1 | Physics Learning Media and Materials | | √ | | | | | √ | √ | √ | | |
| 2 | Physics Learning Strategies | | √ | | √ | | | √ | √ | | | |
| 3 | Research Methodology | | √ | | | | | √ | √ | | | |
| 4 | Digital Electronics Practicum | | | √ | | √ | | | | | | |
| 5 | Nuclear Physics | | | √ | | √ | | | | | | |
| 6 | Physics Experiment | | | √ | | √ | | | | | | |
| 7 | Introduction to Quantum Mechanics | | | √ | | √ | | | | | | |
| 8 | Solid State Physics | | | √ | | √ | | | | | | |
| Semester 6 | | | | | | | | | | | | |
| 1 | Educational Physics Laboratory | | √ | | √ | | | | √ | | | |
| 2 | Assessment of Learning Processes and Outcomes | | √ | | √ | | | √ | √ | | | |
| 3 | Scientific Publications in Physics Education | √ | √ | | | | √ | √ | √ | | | |
| 4 | Final Project Proposal Seminar | | √ | | | | √ | | | | | |
| 5 | Microteaching | √ | √ | | √ | | | | √ | | | |
| 6 | Technology-Based Entrepreneurship | √ | | | | | | | | | | √ |
| Semester 7 | | | | | | | | | | | | |
| 1 | Internship – Curriculum Analysis | √ | √ | | √ | | | √ | | | | |
| 2 | Internship – Lesson Plan Development | √ | √ | | √ | | | √ | | | | |
| 3 | Internship – Learning Media Development | √ | √ | | √ | | | √ | | | | |
| 4 | Internship – Teaching Practice | √ | √ | | √ | | | √ | | | | |
| 5 | PCB Design | | | √ | | | | | | | √ | |
| | Multimedia Project Design and Research | | √ | | | | | | | √ | | |
| 6 | Embedded Systems Programming | | | √ | | | | | | | √ | |



| No | Course Name | PLO | | | | | | | | | | | |
|------------|--|-----|---|---|---|---|---|---|---|---|----|----|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | |
| 7 | Digital Visual Development and Storytelling | | √ | | | | | | | | √ | | |
| 8 | System Interfacing | | | √ | | | | | | | | √ | |
| 9 | Multimedia Asset Design and Production | | √ | | | | | | | | √ | | |
| 10 | Robotics | | | √ | | | | | | | | √ | |
| 11 | Audio-Visual Integration in Multimedia | | √ | | | | | | | | √ | | |
| Semester 8 | | | | | | | | | | | | | |
| 1 | Community Service - Problem Solving in the Community | √ | | | | | | | | √ | | | √ |
| 2 | Final Project | | √ | | | | √ | | | | | | |



7. Organisation of programme courses

Table 7.1. Course Organisation

| No | Credit | Course Code | Course Name | Course Group | | | | Course Group | | | | | | |
|----|--------|-------------|--|-------------------|-----------------|--------------------------------------|----------------------------------|--------------|------|-----|-----|-----|------|--|
| | | | | Compulsory Course | Elective Course | Compulsory Courses in the Curriculum | Characteristic Courses of UPGRIS | MPK | MPKK | MKB | MPB | MBB | MKDK | |
| 1 | 2 | 3325121601 | Islamic Religious Education | | | √ | | √ | | | | | | |
| | | 3325121602 | Christian Religious Education | | | √ | | √ | | | | | | |
| | | 3325121603 | Catholic Religious Education | | | √ | | √ | | | | | | |
| | | 3325121604 | Buddhist Religious Education | | | √ | | √ | | | | | | |
| | | 3325121605 | Hindu Religious Education | | | √ | | √ | | | | | | |
| | | 3325121606 | Confucian Religious Education | | | √ | | √ | | | | | | |
| 2 | 2 | 3325121607 | Pancasila Education | | | √ | | √ | | | | | | |
| 3 | 2 | 3325121608 | Civics Education | | | √ | | √ | | | | | | |
| 4 | 2 | 3325121609 | Indonesian Language | | | √ | | √ | | | | | | |
| 5 | 2 | 3325221610 | PGRI Studies | | | | √ | | | | √ | | | |
| 6 | 2 | 3325221611 | English | | | | √ | | √ | | | | | |
| 7 | 4 | 3325241612 | Technology-Based Entrepreneurship | | | | √ | | | | | | √ | |
| 8 | 4 | 3325241613 | Community Service Programme – Problem Solving in the Community | | | | √ | | | | | | √ | |
| | | 3325221614 | Community Service Programme – Digital Literacy | | | | √ | | | | | | √ | |
| | | 3325221615 | Community Service Programme – Inclusive and Exclusive Leadership | | | | √ | | | | | | √ | |



| No | Credit | Course Code | Course Name | Course Group | | | | Course Group | | | | | | |
|----|--------|-------------|--|-------------------|-----------------|--------------------------------------|----------------------------------|--------------|------|-----|-----|-----|------|---|
| | | | | Compulsory Course | Elective Course | Compulsory Courses in the Curriculum | Characteristic Courses of UPGRIS | MPK | MPKK | MKB | MPB | MBB | MKDK | |
| | | 3325221616 | Community Service Programme – Non-Formal Education | | | | √ | | | | | | √ | |
| 9 | 2 | 3325321617 | Foundations of Education | √ | | | | | | | | | | √ |
| 10 | 2 | 3325321618 | Student Development | √ | | | | | | | | | | √ |
| 11 | 2 | 3325321619 | General Biology | √ | | | | | √ | | | | | |
| 12 | 2 | 3325321620 | Basic Chemistry | √ | | | | | √ | | | | | |
| 13 | 2 | 3325321621 | Calculus | √ | | | | | √ | | | | | |
| 14 | 4 | 3325341622 | Basic Physics: Thermal Mechanics | √ | | | | | | | | | | √ |
| 15 | 4 | 3325341623 | Basic Physics: Electromagnetism | √ | | | | | | | | | | √ |
| 16 | 2 | 3325321624 | Thermodynamics | √ | | | | | √ | | | | | |
| 17 | 2 | 3325321625 | Basic Electronics | √ | | | | | | | | | | √ |
| 18 | 3 | 3325331626 | Introduction to Mathematics for Physics | √ | | | | | | | | | | √ |
| 19 | 2 | 3325322627 | Computer Programming | √ | | | | | | | | | | √ |
| 20 | 2 | 3325321628 | Classical Mechanics | √ | | | | | √ | | | | | √ |
| 21 | 3 | 3325331629 | Physics Learning and Instruction | √ | | | | | | | | | | √ |
| 22 | 2 | 3325321630 | Basic Statistics | √ | | | | | √ | | | | | |
| 23 | 3 | 3325331631 | Mathematical Physics | √ | | | | | √ | | | | | |
| 24 | 3 | 3325331632 | Electricity and Magnetism | √ | | | | | √ | | | | | |



| No | Credit | Course Code | Course Name | Course Group | | | | Course Group | | | | | | | |
|----|--------|-------------|---------------------------------------|-------------------|-----------------|--------------------------------------|----------------------------------|--------------|------|-----|-----|-----|------|--|---|
| | | | | Compulsory Course | Elective Course | Compulsory Courses in the Curriculum | Characteristic Courses of UPGRIS | MPK | MPKK | MKB | MPB | MBB | MKDK | | |
| 25 | 2 | 3325322633 | Computational Physics | √ | | | | | | | | | | | V |
| 26 | 1 | 3325312634 | Basic Electronics Practical | √ | | | | | | | | | | | V |
| 27 | 3 | 3325321635 | 10th Grade Senior High School Physics | √ | | | | | √ | | | | | | |
| 28 | 2 | 3325321636 | English for Physics Instruction | √ | | | | | √ | | | | | | |
| 29 | 2 | 3325331637 | Multi-Body Systems Mechanics | √ | | | | | √ | | | | | | |
| 30 | 2 | 3325321638 | Modern Physics | √ | | | | | √ | | | | | | |
| 31 | 3 | 3325331639 | Physics Learning Design | √ | | | | | √ | | | | | | |
| 32 | 3 | 3325331640 | Waves and Optics | √ | | | | | √ | | | | | | |
| 33 | 2 | 3325321641 | Digital Electronics | √ | | | | | | | | | | | √ |
| 34 | 2 | 3325321642 | 11th Grade Senior High School Physics | √ | | | | | √ | | | | | | |
| 35 | 2 | 3325321643 | Statistical Physics | √ | | | | | √ | | | | | | |
| 36 | 2 | 3325321644 | Applied Physics | √ | | | | | √ | | | | | | |
| 37 | 2 | 3325321645 | Philosophy of Science | √ | | | | | √ | | | | | | |
| 38 | 4 | 3325341646 | Physics Learning Media and Materials | √ | | | | | | | | | | | √ |
| 39 | 3 | 3325331647 | Physics Learning Strategies | √ | | | | | | | | | | | √ |
| 40 | 3 | 3325331648 | Research Methodology | √ | | | | | √ | | | | | | |
| 41 | 1 | 3325312649 | Digital Electronics Practicum | √ | | | | | | | | | | | √ |



| No | Credit | Course Code | Course Name | Course Group | | | | Course Group | | | | | | |
|----|--------|-------------|---|-------------------|-----------------|--------------------------------------|----------------------------------|--------------|------|-----|-----|-----|------|---|
| | | | | Compulsory Course | Elective Course | Compulsory Courses in the Curriculum | Characteristic Courses of UPGRIS | MPK | MPKK | MKB | MPB | MBB | MKDK | |
| 42 | 2 | 3325321650 | Nuclear Physics | √ | | | | | √ | | | | | |
| 43 | 2 | 3325322651 | Physics Experiment | √ | | | | | √ | | | | | |
| 44 | 2 | 3325321652 | Introduction to Quantum Mechanics | √ | | | | | √ | | | | | |
| 45 | 2 | 3325321653 | Solid State Physics | √ | | | | | √ | | | | | |
| 46 | 2 | 3325321654 | Physics Education Laboratory | √ | | | | | √ | | | | | |
| 47 | 3 | 3325332655 | Evaluation of the Learning Process and Outcomes | √ | | | | | | | | | | √ |
| 48 | 2 | 3325321656 | Scientific Publications in Physics Education | √ | | | | | | √ | | | | |
| 49 | 2 | 3325323657 | Final Project Proposal Seminar | √ | | | | | | √ | | | | |
| 50 | 2 | 3325322658 | Microteaching | √ | | | | | | | | | | √ |
| 51 | 2 | 3325324659 | Internship – Curriculum Analysis | √ | | | | | | √ | | | | |
| 52 | 2 | 3325324660 | Internship – Lesson Plan Development | √ | | | | | | √ | | | | |
| 53 | 2 | 3325324661 | Internship – Learning Media Development | √ | | | | | | √ | | | | |
| 54 | 4 | 3325344662 | Internship – Teaching Practice | √ | | | | | | √ | | | | |
| 55 | 3 | 3325532663 | PCB Design | | √ | | | | | √ | | | | |
| | | 3325532664 | Multimedia Project Research and Design | | √ | | | | | √ | | | | |
| 56 | 3 | 3325532665 | Embedded Systems Programming | | √ | | | | | √ | | | | |



| No | Credit | Course Code | Course Name | Course Group | | | | Course Group | | | | | | |
|----|--------|-------------|---|-------------------|-----------------|--------------------------------------|----------------------------------|--------------|------|-----|-----|-----|------|--|
| | | | | Compulsory Course | Elective Course | Compulsory Courses in the Curriculum | Characteristic Courses of UPGRIS | MPK | MPKK | MKB | MPB | MBB | MKDK | |
| | | 3325532666 | Digital Visual Development and Storytelling | | √ | | | | | √ | | | | |
| 57 | 2 | 3325522667 | System Interfacing | | V | | | | | √ | | | | |
| | | 3325522668 | Multimedia Asset Design and Production | | V | | | | | √ | | | | |
| 58 | 2 | 3325522669 | Robotics | | √ | | | | | √ | | | | |
| | | 3325522670 | Audio-Visual Integration in Multimedia | | √ | | | | | √ | | | | |
| 59 | 6 | 3325265671 | Final Project | | | | √ | | | √ | | | | |
| | 144 | | | | | | | | | | | | | |



Table 7.2. Course Organisation Matrix

| Semester | Credit | No. of Courses | Course Group | | | | | | | | | | | | | | | | | | | |
|----------|--------|----------------|--|---|---|--|--|--|--|--|------------------|--|--|--|-------------------|--|---|--|--|--|--|--|
| | | | Compulsory Courses | | | | | | | | Elective Courses | | | | Compulsory Course | | Courses Specific to the Indonesian Teachers' Union University, Semarang | | | | | |
| VIII | 10 | 2 | | | | | | | | | | | | | | | | Community Service-Problem Solving in the Community (4 credits) PLO1 + PLO8 + PLO11 | Final Project (6 credits) PLO2 + PLO6 | | | |
| VII | 20 | 8 | Internship-Curriculum Analysis (2 credits) PLO 1 + PLO 2 + PLO 4 | Internship-Lesson Plans Development (2 credits) PLO 1 + PLO 2 + | Internship-Learning Media Development (2 credits) PLO 1 + PLO | Internship-Teaching Practice (4 credits) PLO 1 + PLO 2 + PLO 4 | | | | | | | | | | | 1. PCB Design (3 credits) PLO 3 + PLO 10 2. Multimedia Project | 1. Embedded Systems Programming (3 credits) PLO 3 + PLO | 1. Interfacing (2 credits) PLO 3 + PLO 10 2. Multimedia Asset | 1. Robotics (2 credits) PLO 3 + PLO 10 2. Audio-Visual Integrat | | |



| Semester | Credit | No. of Courses | Course Group | | | | | | | | | | | | | | | | | | |
|----------|--------|----------------|--|---|--|--|---|--|--|--|------------------|--|--|---|--|---|---|--|--|--|---|
| | | | Compulsory Courses | | | | | | | | Elective Courses | | | | Compulsory Course | | Courses Specific to the Indonesian Teachers' Union University, Semarang | | | | |
| | | | + PLO 7 | PLO 4 + PLO 7 | 2 + PLO 4 + PLO 7 | + PLO 7 | | | | | | | | Research and Design (3 credits) PLO 2 + PLO 9 | 10 2. Visual and Digital Narrative Development (3 credits) PLO 2 + PLO 9 | Design and Production (2 credits) PLO 2 + PLO 9 | ion in Multimedia (2 credits) PLO 2 + PLO 9 | | | | |
| VI | 15 | 6 | Educational Physics Laboratory (2 credits) PLO 2 + PLO 4 + PLO 8 | Assessment of Learning Process and Outcomes (3 credits) PLO 2 + PLO 2 + PLO | Scientific Publications in Physics Education (2 credits) PLO 1 + PLO 2 + | Final Project Proposal Seminar (2 credits) PLO 2 + PLO 6 | Microteaching (2 credits) PLO 1 + PLO 2 + PLO 4 + PLO 8 | | | | | | | | | | | | | | 4 |



| Semester | Credit | No. of Courses | Course Group | | | | | | | | | | | | | | | | | |
|----------|--------|----------------|--|---|--|--|---|---|---|---|---|------------------|--|--|--|-------------------|--|---|--|--|
| | | | Compulsory Courses | | | | | | | | | Elective Courses | | | | Compulsory Course | | Courses Specific to the Indonesian Teachers' Union University, Semarang | | |
| | | | | 4 + PLO 7 + PLO 8 | PLO 6 + PLO 7 + PLO 8 | | | | | | | | | | | | | | | |
| V | 19 | 8 | Physics Teaching Materials and Resources (4 credits) PLO 2 + PLO 7 + PLO 8 + PLO 9 | Physics Teaching Strategies (3 credits) PLO 2 + PLO 4 + PLO 7 + PLO 8 | Research Methodology (3 credits) PLO 2 + PLO 7 + PLO 8 | Digital Electronics Practical (1 credit) PLO 3 + PLO 5 | Nuclear Physics (2 credits) PLO 3 + PLO 5 | Physics Experiments (2 credits) PLO 3 + PLO 5 | Introduction to Quantum Mechanics (2 credits) PLO 3 + PLO 5 | Solid State Physics (2 credits) PLO 3 + PLO 5 | | | | | | | | | | |
| IV | 20 | 9 | Mechanics of Multiple Systems (2 credits) + PLO | Modern Physics (2 credits) PLO 3 + PLO | Physics Instructional Design (3 credits) PLO 2 | Waves and Optics (3 credits) PLO 3 + PLO | Digital Electronics (2 credits) PLO 3 + PLO 5 | Secondary School Physics, Year 11 (2 credits) | Statistical Physics (2 credits) PLO 3 + PLO | Applied Physics (2 credits) PLO 3 + PLO | Philosophy of Science (2 credits) PLO 2 + PLO | | | | | | | | | |



| Semester | Credit | No. of Courses | Course Group | | | | | | | | | | | | | | | | | |
|----------|--------|----------------|---|--|--|---|--|--|---|--|---|------------------|--|--|--|-------------------|--|---|---|---------------------------------|
| | | | Compulsory Courses | | | | | | | | | Elective Courses | | | | Compulsory Course | | Courses Specific to the Indonesian Teachers' Union University, Semarang | | |
| | | | PLO 3 + PLO 5 | 5 | + PLO 4 + PLO 7 + PLO 8 | 5 | | PLO 2 + PLO 7 + PLO 8 | 5 | 5 | 7 + PLO 8 | | | | | | | | | |
| III | 21 | 9 | Classical Mechanics (2 credits) PLO 3 + PLO 5 | Physics Teaching and Learning (3 credits) PLO 2 + PLO 7 | Basic Statistics (2 credits) + PLO 4 | Mathematics for Physics (3 credits) + PLO 5 | Electricity and Magnetism (3 credits) + PLO 5 | Computational Physics (2 credits) + PLO 5 | Basic Electronics Practical (1 credit) + PLO 5 | Secondary School Physics, Year 10 (3 credits) + PLO 7 + PLO 8 | <i>English for Physics Instruction</i> (2 credits) + PLO 7 + PLO 8 | | | | | | | | | |
| II | 19 | 8 | Basic Physics : Electromagnetism (4 credits) PLO 3 + PLO | Thermodynamics (2 credits) PLO 3 + PLO 5 | Basic Electronics (2 credits) PLO 3 + PLO 5 | Introduction to Mathematical Physics (3 credits) + PLO | Computer Programming (2 credits) + PLO 5 | | | | | | | | | | | Pancasila Education (2 credits) + PLO 11 | Indonesian Language (2 credits) + PLO 11 | English (2 credits) + PLO 11 |



| Semester | Credit | No. of Courses | Course Group | | | | | | | | | | | | | | | | | |
|----------|--------|----------------|---|--|--|--|---------------------------------------|---|--|--|------------------|--|--|--|-------------------|--|---|---|--|--|
| | | | Compulsory Courses | | | | | | | | Elective Courses | | | | Compulsory Course | | Courses Specific to the Indonesian Teachers' Union University, Semarang | | | |
| | | | 5 | | | 5 | | | | | | | | | | | | | | |
| I | 20 | 9 | Foundations of Education (2 credits) PLO 2 + PLO 4 | Student Development (2 credits) PLO 2 + PLO 4 + PLO 8 | General Biology (2 credits) PLO 3 + PLO 5 | Basic Chemistry (2 credits) PLO 3 + PLO 5 | Calculus (2 credits) PLO 3 + PLO 5 | Basic Physics : Thermodynamics (4 credits) PLO 3 + PLO 5 | | | | | | | | | | Religious Education (2 credits) PLO 1 + PLO 11 | Civics Education (2 credits) PLO 1 + PLO 11 | PGRI Studies (2 credits) PLO 1 + PLO 11 |
| | 144 | 59 | | | | | | | | | | | | | | | | | | |



8. PLO Fulfilment Chart for Courses

Table 8.1. PLO Fulfilment Map in Courses

| Learning Outcomes/Sub-Learning Outcomes | Course Name/Course Block/Semi-Block | | | | | | | |
|---|-------------------------------------|------------------------|--------------------|---------------------------------|---|--|--|---|
| | Year 1 | | Year 2 | | Year 3 | | Year 4 | |
| | Semester 1 | Semester 2 | Semester 3 | Semester 4 | Semester 5 | Semester 6 | Semester 7 | Semester 8 |
| PLO 1. Able to demonstrate character and conduct that reflect adaptability, enthusiasm and integrity as an expression of devotion to God Almighty. | Religious Education XX | Pancasila Education XX | | | | Scientific Publications in Physics Education X | Internship-Curriculum Analysis XX | Community Service – Problem Solving in the Community XX |
| | Civic Education XX | Indonesian Language X | | | | Microteaching X | Internship – Lesson Plans Development XX | |
| | PGRI Studies X | English X | | | | Technology-Based Entrepreneurship X | Internship – Learning Media Development XX | |
| | | | | | | | Internship – Teaching Practice XX | |
| PLO 2. Understanding educational theory and learner development, research methodology in physics education and physics, as well as the principles, methods, and | Foundations of Education XX | | Basic Statistics X | Physics Instructional Design XX | Physics Teaching Materials and Resources XX | Educational Physics Laboratory XX | Multimedia Research and Project Design XX | Final Project XX |
| | Student | | English for | 11th Grade | Physics | Evaluation of | Digital Visuals | |



| Learning Outcomes/Sub-Learning Outcomes | Course Name/Course Block/Semi-Block | | | | | | | |
|--|-------------------------------------|---------------|--|-------------------------------|------------------------|--|--|------------|
| | Year 1 | | Year 2 | | Year 3 | | Year 4 | |
| | Semester 1 | Semester 2 | Semester 3 | Semester 4 | Semester 5 | Semester 6 | Semester 7 | Semester 8 |
| techniques of contextual physics learning utilising ICT. | Development XX | | Physics Instruction X | Senior High School Physics XX | Learning Strategies XX | Learning Processes and Outcomes XX | Development and Storytelling XX | |
| | | | 10th Grade Senior High School Physics XX | Philosophy of Science X | Research Methodology X | Scientific Publications in Physics Education X | Multimedia Asset Design and Production XX | |
| | | | Physics Learning and Instruction XX | | | Final Project Proposal Seminar X | Audio-Visual Integration in Multimedia XX | |
| | | | | | | Microteaching XX | Internship-Curriculum Analysis XX | |
| | | | | | | | Internship – Lesson Plans Development XX | |
| | | | | | | | Internship – Learning Media Development XX | |
| | | | | | | | Internship – Teaching Practice XX | |
| PLO 3. Mastery of theoretical | Basic Physics, | Thermodynamic | Classical | Mechanics of | Introduction to | | PCB Design | |



| Learning Outcomes/Sub-Learning Outcomes | Course Name/Course Block/Semi-Block | | | | | | | |
|---|-------------------------------------|--|-----------------------------------|-------------------------------|-------------------------------------|--------------------------------------|---------------------------------------|------------|
| | Year 1 | | Year 2 | | Year 3 | | Year 4 | |
| | Semester 1 | Semester 2 | Semester 3 | Semester 4 | Semester 5 | Semester 6 | Semester 7 | Semester 8 |
| concepts in classical and modern physics, principles and applications of mathematics, computation, and physics instrumentation, as well as operational knowledge of instruments and software used in the field of physics and its teaching. | Mechanics and Thermodynamics XX | s X | Mechanics XX | Systems XX | Quantum Mechanics XX | | XX | |
| | Calculus XX | Introduction to Mathematical Physics XX | Mathematics for Physics XX | Modern Physics XX | Physics Experiments XX | | Embedded Systems Programming XX | |
| | Basic Chemistry X | Basic Electronics Practicum XX | Electricity and Magnetism XX | Waves and Optics XX | Solid State Physics XX | | Interfacing System XX | |
| | General Biology X | Computer Programming XX | Computational Physics XX | Digital Electronics XX | Nuclear Physics XX | | Robotics XX | |
| | | Basic Electronics | Basic Electronics Practicum XX | Statistical Physics XX | Digital Electronics Practicum XX | | | |
| | | | | Applied Physics XX | | | | |
| PLO 4. Able to design, implement, manage, and evaluate secondary school physics teaching independently and innovatively using a scientific approach, based on pedagogical content knowledge | Foundations of Education XX | | Basic Statistics X | Physics Learning Design XX | Physics Learning Strategies XX | Physics Education Laboratory XX | Internship-Curriculum Analysis XX | |
| | Student Development XX | | | | | Evaluation of Learning Processes and | Internship – Lesson Plans Development | |



| Learning Outcomes/Sub-Learning Outcomes | Course Name/Course Block/Semi-Block | | | | | | | |
|---|---|---|------------------------------------|-------------------------------|---|---------------------|---|------------|
| | Year 1 | | Year 2 | | Year 3 | | Year 4 | |
| | Semester 1 | Semester 2 | Semester 3 | Semester 4 | Semester 5 | Semester 6 | Semester 7 | Semester 8 |
| and instructional design principles, as well as effectively utilising science and technology and learning resources (including laboratories) to develop students' scientific thinking skills. | | | | | | Outcomes XX | XX | |
| | | | | | | Microteaching XX | Internship – Learning Media Development XX | |
| | | | | | | | Internship – Teaching Practice XX | |
| PLO 5. Able to apply concepts of classical and modern physics, mathematics, and instrumentation and software technology to analyse and solve physics problems accurately and systematically. | Basic Physics: Mechanics and Thermodynamics XX | Thermodynamics XX | Classical Mechanics XX | Mechanics of Systems XX | Introduction to Quantum Mechanics XX | | | |
| | Calculus XX | Introduction to Mathematics for Physics XX | Mathematical Physics XX | Modern Physics XX | Physics Experiments XX | | | |
| | Basic Chemistry X | Basic Electronics Practicum XX | Electricity and Magnetism XX | Nuclear Physics XX | Solid State Physics XX | | | |
| | General Biology X | Computer Programming XX | Statistical Physics XX | Waves and Optics XX | Nuclear Physics XX | | | |
| | | Basic Electronics | Computational Physics | Digital Electronics | Digital Electronics | | | |



| Learning Outcomes/Sub-Learning Outcomes | Course Name/Course Block/Semi-Block | | | | | | | |
|---|-------------------------------------|--------------------------------|--------------------------------------|--|---|--|---|------------------|
| | Year 1 | | Year 2 | | Year 3 | | Year 4 | |
| | Semester 1 | Semester 2 | Semester 3 | Semester 4 | Semester 5 | Semester 6 | Semester 7 | Semester 8 |
| | | XX | XX | XX | XX | | | |
| | | Basic Electronics Practicum XX | Statistical Physics XX | | | | | |
| | | | Applied Physics XX | | | | | |
| PLO 6. Able to conduct research and scientific studies in the field of physics education and physics as an alternative problem-solving approach to produce published scientific papers | | | | | | Scientific Publications in Physics Education XX | | Final Project XX |
| | | | | | | Final Project Proposal Seminar XX | | |
| PLO 7. Able to make appropriate decisions based on the analysis of information and data in the fields of physics and physics education, and able to provide guidance in selecting various alternative solutions both independently and in groups. | | | English for Physics Instruction XX | Physics Learning Design XX | Physics Teaching Materials and Resources XX | Evaluation of Learning Processes and Outcomes XX | Internship-Curriculum Analysis XX | |
| | | | Physics Learning and Teaching XX | 11th Grade Senior High School Physics XX | Physics Learning Strategies XX | Scientific Publications in Physics Education XX | Internship – Lesson Plans Development XX | |
| | | | Secondary School Physics, Year 10 XX | Philosophy of Science X | Research Methodology XX | | Internship – Development of Learning Media XX | |
| | | | | | | | Internship – | |



| Learning Outcomes/Sub-Learning Outcomes | Course Name/Course Block/Semi-Block | | | | | | | |
|--|-------------------------------------|------------|---|--|---|--|--|---|
| | Year 1 | | Year 2 | | Year 3 | | Year 4 | |
| | Semester 1 | Semester 2 | Semester 3 | Semester 4 | Semester 5 | Semester 6 | Semester 7 | Semester 8 |
| | | | | | | | Teaching Practice XX | |
| PLO 8. Takes responsibility for the field of physics education and can be entrusted with responsibility for the achievement of group work outcomes. | Student Development XX | | 10th Grade Senior High School PhysicsXX | Physics Learning Design XX | Physics Teaching Materials and Resources XX | Physics Education Laboratory XX | | |
| | | | English for Physics Teaching XX | 11th Grade Senior High School Physics XX | Physics Teaching Strategies XX | Evaluation of Learning Processes and Outcomes XX | | Community Service– Problem Solving in the Community |
| | | | | Philosophy of Science XX | Research Methodology XX | Scientific Publications in Physics Education XX | | |
| PLO 9. Able to creatively and contextually develop innovative technology-based multimedia learning resources, and manage educational products as a form of entrepreneurship in the field of education. | | | | | Physics Learning Media and Materials XX | Microteaching XX | Multimedia Project Design and Research XX | |
| | | | | | | | Digital Visual Development and Storytelling XX | |
| | | | | | | | Multimedia Asset Design and Production | |



| Learning Outcomes/Sub-Learning Outcomes | Course Name/Course Block/Semi-Block | | | | | | | |
|---|-------------------------------------|---------------------------|------------|------------|------------|---|--|--|
| | Year 1 | | Year 2 | | Year 3 | | Year 4 | |
| | Semester 1 | Semester 2 | Semester 3 | Semester 4 | Semester 5 | Semester 6 | Semester 7 | Semester 8 |
| | | | | | | | XX | |
| | | | | | | | Audio-Visual Integration in Multimedia XX | |
| PLO 10. Able to independently develop prototype electronics-based systems or products and software. | | | | | | | PCB Design XX | |
| | | | | | | | Embedded Systems Programming XX | |
| | | | | | | | System Interfacing XX | |
| | | | | | | | Robotics XX | |
| PLO 11. Evaluating and integrating concepts of religion, nationalism, the constitution, language, and technology-based entrepreneurship with the 5A values (anti-violence, anti-drugs, anti-bullying, anti-intolerance, and anti-corruption) to support the development of professional knowledge and practice. | Religious Education XX | Pancasila Education XX | | | | Technology-Based Entrepreneurship XX | | Community Service – Problem Solving in the Community XX |
| | Civic Education XX | Indonesian Language XX | | | | | | |
| | PGRI Studies XX | English XX | | | | | | |





9. Distribution of courses per semester and PLO assessment scheduling

9.1. Course Distribution

Table 9.1. List of first-semester courses

| No | Course Code | Course | T | P | S | L | TA | Total credits | Course Name Prerequisites |
|----------------------------------|-------------|---|-----|-----|-----|-----|-----|---------------|----------------------------------|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| 1 | 3325121601 | Islamic Religious Education | 1 | 1 | | | | 2 | |
| 2 | 3325121608 | Civic Education | 1 | 1 | | | | 2 | |
| 3 | 3325221610 | PGRI Studies | 1 | 1 | | | | 2 | |
| 4 | 3325321617 | Foundations of Education | 2 | | | | | 2 | |
| 5 | 3325321618 | Student Development | 2 | | | | | 2 | |
| 6 | 3325321619 | General Biology | 2 | | | | | 2 | |
| 7 | 3325321620 | Basic Chemistry | 2 | | | | | 2 | |
| 8 | 3325321621 | Calculus | 2 | | | | | 2 | |
| 9 | 3325341622 | Basic Physics: Thermodynamics | 3 | 1 | | | | 4 | |
| Total Course Load for Semester I | | | | | | | | 20 | |
| Semester II | | | | | | | | | |
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| 1 | 3325121607 | Pancasila Education | 1 | 1 | | | | 2 | |
| 2 | 3325121609 | Indonesian Language | 1 | 1 | | | | 2 | |
| 3 | 3325221611 | English | 1 | 1 | | | | 2 | |
| 4 | 3325341623 | Basic Physics: Electromagnetism | 3 | 1 | | | | 4 | Basic Physics: Thermal Mechanics |
| 5 | 3325321624 | Thermodynamics | 2 | | | | | 2 | Basic Physics: Thermal Mechanics |
| 6 | 3325321625 | Basic Electronics | 2 | | | | | 2 | |
| 7 | 3325331626 | Introduction to Mathematics for Physics | 3 | | | | | 3 | Calculus |



| No | Course Code | Course | T | P | S | L | TA | Total credits | Course Name Prerequisites |
|-----------------------------------|-------------|----------------------|---|---|---|---|----|---------------|---------------------------|
| 8 | 3325322627 | Computer Programming | 2 | | | | | 2 | |
| Total Course Load for Semester II | | | | | | | | 19 | |

Semester III

| No | Course Code | Course | T | P | S | L | TA | Total credits | Course Name Prerequisites |
|------------------------------------|-------------|---------------------------------------|-----|-----|-----|-----|-----|---------------|--|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| 1 | 3325321628 | Classical Mechanics | 3 | | | | | 3 | Basic Physics, Thermal Mechanics, Introduction to Mathematical Physics |
| 2 | 3325331629 | Physics Learning and Instruction | 3 | | | | | 3 | Foundations of Education, Student Development |
| 3 | 3325321630 | Basic Statistics | 2 | | | | | 2 | |
| 4 | 3325331631 | Mathematical Physics | 3 | | | | | 3 | Introduction to Mathematical Physics, Calculus |
| 5 | 3325331632 | Electricity and Magnetism | 3 | | | | | 3 | Basic Physics: Electromagnetism |
| 6 | 3325322633 | Computational Physics | | 2 | | | | 2 | Computer Programming |
| 7 | 3325312634 | Basic Electronics Practicum | | 1 | | | | 1 | Basic Electronics |
| 8 | 3325321635 | 10th Grade Senior High School Physics | 3 | | | | | 3 | Basic Physics: Thermodynamics |
| 9 | 3325321636 | English for Physics Instruction | 2 | | | | | 2 | English |
| Total Course Load for Semester III | | | | | | | | 22 | |

Semester IV

| No | Course Code | Course | T | P | S | L | TA | Number of credits | Course Name Prerequisites |
|-----|-------------|------------------------------|-----|-----|-----|-----|-----|-------------------|---|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| 1 | 3325331637 | Multi-Body Systems Mechanics | 3 | | | | | 3 | Fundamentals of Physics: Thermal Mechanics, |



| No | Course Code | Course | T | P | S | L | TA | Total credits | Course Name Prerequisites |
|-----------------------------------|-------------|---------------------------------------|---|---|---|---|----|---------------|---|
| | | | | | | | | | Fundamentals of Physics: Electromagnetism |
| 2 | 3325321638 | Modern Physics | 3 | | | | | 3 | Fundamentals of Physics: Thermal Mechanics, Fundamentals of Physics: Electromagnetism |
| 3 | 3325331639 | Physics Learning Design | 3 | | | | | 3 | Educational Foundations, Learner Development, Learning and Teaching |
| 4 | 3325331640 | Waves and Optics | 3 | | | | | 3 | Basic Physics: Electromagnetism |
| 5 | 3325321641 | Digital Electronics | 2 | | | | | 2 | Basic Electronics |
| 6 | 3325321642 | 11th Grade Senior High School Physics | 2 | | | | | 2 | Basic Physics: Electromagnetism, Waves and Optics |
| 7 | 3325321643 | Statistical Physics | 2 | | | | | 2 | Thermodynamics |
| 8 | 3325321644 | Applied Physics | | | | 2 | | 2 | |
| 9 | 3325321645 | Philosophy of Science | 2 | | | | | 2 | |
| Total Course Load for Semester IV | | | | | | | | 22 | |

Semester V

| No | Course Code | Course | T | P | S | L | TA | Total credits | Course Name Prerequisites |
|-----|-------------|--------------------------------------|-----|-----|-----|-----|-----|---------------|------------------------------|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| 1 | 3325341646 | Physics Learning Media and Materials | 3 | 1 | | | | 4 | Physics Instructional Design |
| 2 | 3325331647 | Physics Learning Strategies | 3 | | | | | 3 | Learning and Teaching |
| 3 | 3325331648 | Research Methodology | 3 | | | | | 3 | Basic Statistics |
| 4 | 3325312649 | Digital Electronics Practicum | | 1 | | | | 1 | Digital Electronics |



| No | Course Code | Course | T | P | S | L | TA | Total credits | Course Name Prerequisites |
|----------------------------------|-------------|-----------------------------------|---|---|---|---|----|---------------|--|
| 5 | 3325321650 | Nuclear Physics | 3 | | | | | 3 | Modern Physics |
| 6 | 3325322651 | Physics Experiments | | 2 | | | | 2 | Modern Physics, Nuclear Physics, Introduction to Quantum Mechanics |
| 7 | 3325321652 | Introduction to Quantum Mechanics | 3 | | | | | 3 | Modern Physics |
| 8 | 3325321653 | Solid State Physics | 3 | | | | | 3 | Modern Physics |
| Total Course Load for Semester V | | | | | | | | 22 | |

Semester VI

| No | Course Code | Course | T | P | S | L | TA | Total credits | Course Name Prerequisites |
|-----|-------------|--|-----|-----|-----|-----|-----|---------------|---|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| 1 | 3325321654 | Physics Education Laboratory | | 2 | | | | 2 | Fundamentals of Physics: Thermal Mechanics, Fundamentals of Physics: Electromagnetism, Fundamentals of Electronics, Digital Electronics, Digital Electronics Laboratory |
| 2 | 3325332655 | Evaluation of Learning Process and Outcomes | 3 | | | | | 3 | Physics Instructional Design, Learning and Teaching |
| 3 | 3325321656 | Scientific Publications in Physics Education | 2 | | | | | 2 | Research Methodology, Final Project Proposal Seminar |
| 4 | 3325323657 | Final Project Proposal Seminar | 2 | | | | | 2 | Research Methodology |
| 5 | 3325322658 | Microteaching | | 2 | | | | 2 | Learning and Teaching, Instructional Design, Physics Teaching Strategies, Assessment of Learning Processes and Outcomes |



| No | Course Code | Course | T | P | S | L | TA | Total credits | Course Name Prerequisites |
|-----------------------------------|-------------|--|-----|-----|-----|-----|-----|---------------|--|
| 6 | 3325241612 | Technology-Based Entrepreneurship | 1 | 2 | | 1 | | 4 | Computer Programming, Media and Physics Teaching Materials |
| Total Course Load for Semester VI | | | | | | | | 15 | |
| Semester VII | | | | | | | | | |
| No | Course Code | Course | T | P | S | L | TA | Total credits | Course Name Prerequisites |
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| 1 | 3325324659 | Internship-Curriculum Analysis | | | | 2 | | 2 | Microteaching, Assessment of Learning Processes and Outcomes, Physics Learning and Teaching, Physics Teaching Strategies, Physics Instructional Design |
| 2 | 3325324660 | Internship- Lesson Plans Development | | | | 2 | | 2 | Microteaching, Evaluation of Learning Processes and Outcomes, Physics Learning and Teaching, Physics Teaching Strategies, Physics Instructional Design |
| 3 | 3325324661 | Internship- Learning Media Development | | | | 2 | | 2 | Microteaching, Assessment of Learning Processes and Outcomes, Physics Learning and Teaching, Physics Teaching Strategies, Physics Instructional Design |
| 4 | 3325344662 | Internship-Teaching Practice (4 credits) | | | | 4 | | 4 | Microteaching, Evaluation of Learning Processes and Outcomes, Learning and |



| No | Course Code | Course | T | P | S | L | TA | Total credits | Course Name Prerequisites | |
|----|-------------|---|---------------|---|---|---|----|-------------------|--|--|
| | | | | | | | | | Teaching Physics, Physics Teaching Strategies, Physics Instructional Design | |
| | | | Total Credits | | | | | | 10 | |
| No | Course Code | Course | T | P | S | L | | Number of credits | Course Name Prerequisites | |
| 5 | 3325532664 | Multimedia Project Design and Research | | 3 | | | | 3 | Physics Teaching Materials and Media | |
| 6 | 3325532666 | Digital Visual Development and Storytelling | | 3 | | | | 3 | Physics Teaching Materials and Media | |
| 7 | 3325522668 | Multimedia Asset Design and Production | | 2 | | | | 2 | Physics Teaching Materials and Resources | |
| 8 | 3325522670 | Audio-Visual Integration in Multimedia | | 2 | | | | 2 | Physics Teaching Materials and Resources | |
| | | | Total Credits | | | | | | 10 | |
| No | Course Code | Course | T | P | S | L | TA | Total credits | Course Name Prerequisites | |
| 5 | 3325532663 | PCB Design | | 3 | | | | 3 | Basic Electronics, Basic Electronics Laboratory, Digital Electronics, Digital Electronics Laboratory | |
| 6 | 3325532665 | Embedded Systems Programming | | 3 | | | | 3 | Computer Programming, Basic Electronics | |
| 7 | 3325522667 | System Interfacing | | 2 | | | | 2 | Basic Electronics, Basic Electronics Laboratory, Digital Electronics, Digital Electronics Laboratory | |



| No | Course Code | Course | T | P | S | L | TA | Total credits | Course Name Prerequisites |
|-------------------------------------|-------------|--|-----|-----|-----|-----|-----|---------------|--|
| 8 | 3325522669 | Robotics | | 2 | | | | 2 | Digital Electronics, Digital Electronics Practical, Computer Programming |
| Total Credits | | | | | | | | 10 | |
| Total Course Load for Semester VII | | | | | | | | 20 | |
| Semester VIII | | | | | | | | | |
| No | Course Code | Course | T | P | S | L | TA | Total credits | Course Name Prerequisites |
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| 1 | 3325241613 | Community Service Programme – Problem Solving in the Community | | | | 4 | | 4 | |
| 2 | 3325665671 | Final Project | | | | | 6 | 6 | Research Methodology, Final Project Proposal Seminar |
| Total Course Load for Semester VIII | | | | | | | | 10 | |

9.2.PLO Assessment Schedule

Table 9.2 PLO Assessment Schedule Table for Programmes Outside the Engineering Field

| NO | Course Code | Course Name | PLO 1 | PLO 2 | PLO 3 | PLO 4 | PLO 5 | PLO 6 | PLO 7 | PLO 8 | PLO 9 | PLO 10 | PLO 11 |
|-----|-------------|-------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) |
| 1 | 3325121601 | Islamic Religious Education | 1 | | | | | | | | | | 1 |
| | 3325121602 | Christian Religious Education | 1 | | | | | | | | | | 1 |
| | 3325121603 | Catholic Religious Education | 1 | | | | | | | | | | 1 |
| | 3325121604 | Buddhist Religious Education | 1 | | | | | | | | | | 1 |



| NO | Course Code | Course Name | PLO 1 | PLO 2 | PLO 3 | PLO 4 | PLO 5 | PLO 6 | PLO 7 | PLO 8 | PLO 9 | PLO 10 | PLO 11 |
|----|-------------|--|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|
| | 3325121605 | Hindu Religious Education | 1 | | | | | | | | | | 1 |
| | 3325121606 | Confucian Religious Education | 1 | | | | | | | | | | 1 |
| 2 | 3325121607 | Pancasila Education | 2 | | | | | | | | | | 2 |
| 3 | 3325121608 | Civics Education | 1 | | | | | | | | | | 1 |
| 4 | 3325121609 | Indonesian Language | 2 | | | | | | | | | | 2 |
| 5 | 3325221610 | PGRI Studies | 1 | | | | | | | | | | 1 |
| 6 | 3325221611 | English | 2 | | | | | | | | | | 2 |
| 7 | 3325241612 | Technology-Based Entrepreneurship | 6 | | | | | | | | | | 6 |
| 8 | 3325241613 | Community Service Programme – Problem Solving in the Community | 8 | | | | | | | 8 | | | 8 |
| 9 | 3325321617 | Foundations of Education | | 1 | | 1 | | | | | | | |
| 10 | 3325321618 | Student Development | | 1 | | 1 | | | | 1 | | | |
| 11 | 3325321619 | General Biology | | | 1 | | 1 | | | | | | |
| 12 | 3325321620 | Basic Chemistry | | | 1 | | 1 | | | | | | |
| 13 | 3325321621 | Calculus | | | 1 | | 1 | | | | | | |
| 14 | 3325341622 | Basic Physics: Thermodynamics | | | 2 | | 2 | | | | | | |
| 15 | 3325341623 | Basic Physics: Electromagnetism | | | 2 | | 2 | | | | | | |
| 16 | 3325321624 | Thermodynamics | | | 2 | | 2 | | | | | | |
| 17 | 3325321625 | Basic Electronics | | | 2 | | 2 | | | | | | |
| 18 | 3325331626 | Introduction to Mathematics for Physics | | | 2 | | 2 | | | | | | |
| 19 | 3325322627 | Computer Programming | | | 2 | | 2 | | | | | | |
| 20 | 3325321628 | Classical Mechanics | | | 3 | | 3 | | | | | | |
| 21 | 3325331629 | Physics Learning and Instruction | | 3 | | | | | 3 | | | | |
| 22 | 3325321630 | Basic Statistics | | 3 | | 3 | | | | | | | |
| 23 | 3325331631 | Mathematical Physics | | | 3 | | 3 | | | | | | |
| 24 | 3325331632 | Electricity and Magnetism | | | 3 | | 3 | | | | | | |
| 25 | 3325322633 | Computational Physics | | | 3 | | 3 | | | | | | |
| 26 | 3325312634 | Basic Electronics Practicum | | | 3 | | 3 | | | | | | |
| 27 | 3325321635 | 10th Grade Senior High School Physics | | 3 | | | | | 3 | 3 | | | |



| NO | Course Code | Course Name | PLO 1 | PLO 2 | PLO 3 | PLO 4 | PLO 5 | PLO 6 | PLO 7 | PLO 8 | PLO 9 | PLO 10 | PLO 11 |
|----|-------------|--|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|
| 28 | 3325321636 | English for Physics Instruction | | 3 | | | | | 3 | 3 | | | |
| 29 | 3325331637 | Multi-Body Systems Mechanics | | | 4 | | 4 | | | | | | |
| 30 | 3325321638 | Modern Physics | | | 4 | | 4 | | | | | | |
| 31 | 3325331639 | Physics Learning Design | | 4 | | 4 | | | 4 | 4 | | | |
| 32 | 3325331640 | Waves and Optics | | | 4 | | 4 | | | | | | |
| 33 | 3325321641 | Digital Electronics | | | 4 | | 4 | | | | | | |
| 34 | 3325321642 | 11th Grade Senior High School Physics | | 4 | | | | | 4 | 4 | | | |
| 35 | 3325321643 | Statistical Physics | | | 4 | | 4 | | | | | | |
| 36 | 3325321644 | Applied Physics | | | 4 | | 4 | | | | | | |
| 37 | 3325321645 | Philosophy of Science | | 4 | | | | | 4 | 4 | | | |
| 38 | 3325341646 | Physics Learning Media and Materials | | 5 | | | | | 5 | 5 | 5 | | |
| 39 | 3325331647 | Physics Learning Strategies | | 5 | | 5 | | | 5 | 5 | | | |
| 40 | 3325331648 | Research Methodology | | 5 | | | | | 5 | 5 | | | |
| 41 | 3325312649 | Digital Electronics Practical | | | 5 | | 5 | | | | | | |
| 42 | 3325321650 | Nuclear Physics | | | 5 | | 5 | | | | | | |
| 43 | 3325322651 | Physics Experiments | | | 5 | | 5 | | | | | | |
| 44 | 3325321652 | Introduction to Quantum Mechanics | | | 5 | | 5 | | | | | | |
| 45 | 3325321653 | Solid State Physics | | | 5 | | 5 | | | | | | |
| 46 | 3325321654 | Physics Education Laboratory | | 6 | | 6 | | | | 6 | | | |
| 47 | 3325332655 | Evaluation of Learning Process and Outcomes | | 6 | | 6 | | | 6 | 6 | | | |
| 48 | 3325321656 | Scientific Publications in Physics Education | 6 | 6 | | | | 6 | 6 | 6 | | | |
| 49 | 3325323657 | Final Project Proposal Seminar | | 6 | | | | 6 | | | | | |
| 50 | 3325322658 | Microteaching | 6 | 6 | | 6 | | | | 6 | | | |
| 51 | 3325324659 | Internship – Curriculum Analysis | 7 | 7 | | 7 | | | 7 | | | | |
| 52 | 3325324660 | Internship – Lesson Plan Development | 7 | 7 | | 7 | | | 7 | | | | |
| 53 | 3325324661 | Internship – Learning Media Development | 7 | 7 | | 7 | | | 7 | | | | |
| 54 | 3325344662 | Internship – Teaching Practice | 7 | 7 | | 7 | | | 7 | | | | |
| 55 | 3325532663 | PCB Design | | | 7 | | | | | | | 7 | |



| NO | Course Code | Course Name | PLO 1 | PLO 2 | PLO 3 | PLO 4 | PLO 5 | PLO 6 | PLO 7 | PLO 8 | PLO 9 | PLO 10 | PLO 11 |
|----|-------------|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|
| | 3325532664 | Multimedia Project Design and Research | | 7 | | | | | | | 7 | | |
| 56 | 3325532665 | Embedded Systems Programming | | | 7 | | | | | | | 7 | |
| | 3325532666 | Digital Visual Development and Storytelling | | 7 | | | | | | | 7 | | |
| 57 | 3325522667 | System Interfacing | | | 7 | | | | | | | 7 | |
| | 3325522668 | Multimedia Asset Design and Production | | 7 | | | | | | | 7 | | |
| 58 | 3325522669 | Robotics | | | 7 | | | | | | | 7 | |
| | 3325522670 | Audio-Visual Integration in Multimedia | | 7 | | | | | | | 7 | | |
| 59 | 3325665671 | Final Project | | 8 | | | | 8 | | | | | |



10. Learning Assessment

10.1 Rubric

A rubric is a guide or assessment framework that outlines the criteria used to evaluate or grade students' learning outcomes. A rubric comprises the dimensions or aspects being assessed, as well as the criteria for students' learning outcomes or indicators of their learning achievements.

The purpose of using a rubric:

- To clarify the dimensions or aspects and levels of assessment of students' learning outcomes;
- To serve as a motivator for students to achieve their learning outcomes.

Rubrics may be comprehensive or general in nature, or they may be specific, applying only to a particular topic or a specific learning outcome. Example of a test paper as part of an assessment instrument: (each question is preceded by the relevant LLO corresponding to that question)

10.2 Portfolio of Learning Outcomes

A portfolio is an instrument/document for assessing learning outcomes based on a collection of information demonstrating the development of a student's PLO achievements over a specific period. This information may consist of the student's best work from the learning process or work demonstrating the development of their ability to achieve learning outcomes.



11. Implementation of Students' Right to Learn (Maximum 3 Semesters)

11.1 Model for the Implementation of Learning Modes Outside the Study Programme

Table 11.1. Implementation Model for Learning Activities Outside the Degree Programme

| Student Learning Activities for Bachelor's / Applied Bachelor's Degree, 144 ECTS | | | | | | | | |
|--|-----------------------------|---|---------------------------------------|---------------------------------------|--------------------------------------|---|---|---|
| | Semester 1 | Semester 2 | Semester 3 | Semester 4 | Semester 5 | Semester 6 | Semester 7 | Semester 8 |
| | 20 credits | 19 credits | 22 credits | 22 credits | 22 credits | 15 credits | 20 credits | 10 credits |
| 1 | Islamic Religious Education | Pancasila Education | Classical Mechanics | Multi-Body Systems Mechanics | Physics Learning Media and Materials | Physics Education Laboratory | Internship – Curriculum Analysis | Community Service Programme– Problem Solving in the Community |
| 2 | Civics Education | Indonesian Language | Physics Learning and Instruction | Modern Physics | Physics Learning Strategies | Evaluation of Learning Processes and Outcomes | Internship – Lesson Plan Development | Final Project |
| 3 | PGRI Studies | English | Basic Statistics | Physics Learning Design | Research Methodology | Scientific Publications in Physics Education | Internship – Learning Media Development | |
| 4 | Foundations of Education | Basic Physics: Electromagnetism | Mathematical Physics | Waves and Optics | Digital Electronics Practicum | Final Project Proposal Seminar | Internship – Teaching Practice (4 credits) | |
| 5 | Student Development | Thermodynamics | Electricity and Magnetism | Digital Electronics | Nuclear Physics | Microteaching | Multimedia Projects Design and Research | |
| 6 | General Biology | Basic Electronics | Computational Physics | 11th Grade Senior High School Physics | Physics Experiments | Technology-Based Entrepreneurship | Digital Visual Development and Storytelling | |
| 7 | Basic Chemistry | Introduction to Mathematics for Physics | Basic Electronics Practicum | Statistical Physics | Introduction to Quantum Mechanics | | Multimedia Asset Design and Production | |
| 8 | Calculus | Computer Programming | 10th Grade Senior High School Physics | Applied Physics | Solid State Physics | | Audio-Visual Integration in Multimedia | |
| 9 | Basic Physics: | | English for Physics | Philosophy of Science | | | PCB Design | |



Student Learning Activities for Bachelor's / Applied Bachelor's Degree, 144 ECTS

| | Semester 1 | Semester 2 | Semester 3 | Semester 4 | Semester 5 | Semester 6 | Semester 7 | Semester 8 |
|--|--------------------------|---------------|---------------|---------------|---------------|---------------|--|---------------|
| | Mechanics and Thermal | | Instruction | | | | | |
| | | | | | | | Embedded Systems Programmin g | |
| | | | | | | | System Interfacing | |
| | | | | | | | Robotics | |

11.2 Compulsory Courses within the Programme

Table 11.2. Compulsory Courses

| No | Course Code | Course Name | Credit Points | Description |
|----|-------------|---|---------------|-------------|
| 1 | 3325121601 | Islamic Religious Education | 2 | |
| | 3325121602 | Christian Religious Education | | |
| | 3325121603 | Catholic Religious Education | | |
| | 3325121604 | Buddhist Religious Education | | |
| | 3325121605 | Hindu Religious Education | | |
| | 3325121606 | Confucian Religious Education | | |
| 2 | 3325121607 | Pancasila Education | 2 | |
| 3 | 3325121608 | Civics Education | 2 | |
| 4 | 3325121609 | Indonesian Language | 2 | |
| 5 | 3325221610 | PGRI Studies | 2 | |
| 6 | 3325221611 | English | 2 | |
| 7 | 3325241612 | Technology-Based Entrepreneurship | 4 | |
| 8 | 3325241613 | Community Service Programme – Problem Solving in the Community | 4 | |
| 9 | 3325321617 | Foundations of Education | 2 | |
| 10 | 3325321618 | Student Development | 2 | |
| 11 | 3325321619 | General Biology | 2 | |
| 12 | 3325321620 | Basic Chemistry | 2 | |
| 13 | 3325321621 | Calculus | 2 | |
| 14 | 3325341622 | Basic Physics: Thermodynamics | 4 | |
| 15 | 3325341623 | Basic Physics: Electromagnetism | 4 | |
| 16 | 3325321624 | Thermodynamics | 2 | |
| 17 | 3325321625 | Basic Electronics | 2 | |
| 18 | 3325331626 | Introduction to Mathematics for Physics | 3 | |
| 19 | 3325322627 | Computer Programming | 2 | |
| 20 | 3325321628 | Classical Mechanics | 3 | |
| 21 | 3325331629 | Physics Learning and Instructions | 3 | |
| 22 | 3325321630 | Basic Statistics | 2 | |
| 23 | 3325331631 | Mathematical Physics | 3 | |
| 24 | 3325331632 | Electricity and Magnetism | 3 | |



| No | Course Code | Course Name | Credit Points | Description |
|----|-------------|---|---------------|-------------|
| 25 | 3325322633 | Computational Physics | 2 | |
| 26 | 3325312634 | Basic Electronics Practicum | 1 | |
| 27 | 3325321635 | 10th Grade Senior High School Physics | 3 | |
| 28 | 3325321636 | English for Physics Instruction | 2 | |
| 29 | 3325331637 | Multi-BodySystems Mechanics of | 3 | |
| 30 | 3325321638 | Modern Physics | 3 | |
| 31 | 3325331639 | Physics Learning Design | 3 | |
| 32 | 3325331640 | Waves and Optics | 3 | |
| 33 | 3325321641 | Digital Electronics | 2 | |
| 34 | 3325321642 | 11th Grade Senior High School Physics | 2 | |
| 35 | 3325321643 | Statistical Physics | 2 | |
| 36 | 3325321644 | Applied Physics | 2 | |
| 37 | 3325321645 | Philosophy of Science | 2 | |
| 38 | 3325341646 | Physics Learning Media and Materials | 4 | |
| 39 | 3325331647 | Physics Learning Strategies | 3 | |
| 40 | 3325331648 | Research Methodology | 3 | |
| 41 | 3325312649 | Digital Electronics Practicum | 1 | |
| 42 | 3325321650 | Nuclear Physics | 3 | |
| 43 | 3325322651 | Physics Experiments | 2 | |
| 44 | 3325321652 | Introduction to Quantum Mechanics | 3 | |
| 45 | 3325321653 | Solid State Physics | 3 | |
| 46 | 3325321654 | Physics Education Laboratory | 2 | |
| 47 | 3325332655 | Evaluation of Learning Processes and Outcomes | 3 | |
| 48 | 3325321656 | Scientific Publications in Physics Education | 2 | |
| 49 | 3325323657 | Final Project Proposal Seminar | 2 | |
| 50 | 3325322658 | Microteaching | 2 | |
| 51 | 3325324659 | Internship – Curriculum Analysis | 2 | |
| 52 | 3325324660 | Internship – Lesson Plan Development | 2 | |
| 53 | 3325324661 | Internship – Learning Media Development | 2 | |
| 54 | 3325344662 | Internship – Teaching Practice | 4 | |
| 55 | 3325265671 | Final Project | 6 | |

11.3 Course learning outside the Study Programme (example)

Table 11.3. Course Study Outside the Degree Programme

| No | Courses taken | Maximum credit weight | Remarks |
|----|--|-----------------------|---|
| 1 | Outside the programme, on/off campus | 2 | Courses taken have the same total credit weight, and have corresponding PLOs and additional competencies. |
| 2 | In the same programme outside the campus | 0 | The courses taken have the same total credit weight; it is recommended that they be selected from courses agreed upon by the association/society of similar study programmes. |
| 3 | Off-campus (DUDI, etc.) | 46 | Courses taken have the same total credit weight, with |



| | | |
|------------------------------------|----|---|
| | | alignment to PLOs and relevant additional competencies. |
| Maximum total credit weight | 48 | |

11.4 Forms of learning activities outside the university

Table 11.4. Forms of Learning Activities Outside the Study Programme

| No | Form of Learning Activity | Can be carried out with credit points | | Notes |
|----|---|---------------------------------------|--|---|
| | | Regular | Fulfilment of Study Load Outside the Study Programme | |
| 1 | Educational Internship | 10 | ≤20 | Internship activities fulfilling the study load outside the degree programme may be converted into several modules that have corresponding PLOs and a duration of study activities commensurate with the module's credit weight. |
| 2 | Work/Industry Placement Centre of Excellence in Electronics Prototyping and Programming | 10 | ≤20 | Internship activities to fulfil the study load outside the study programme can be converted into several courses that have compatible PLOs and learning time commensurate with the course's credit weight. |
| 3 | Work/Industry Placement at the Centre of Excellence (CoE) for PMPM | 10 | ≤20 | Internship activities to fulfil the study load outside the study programme may be converted into several courses that have compatible PLOs and a duration of study activities corresponding to the course's credit weight. |
| 4 | Thematic Community Service Programme, UPGRIS | 10 | ≤20 | The Thematic Community Service Programme at the UPGRIS, which is an extension of the Regular Community Service Programme, may be converted into several courses that have compatible PLOs and a duration of study activities corresponding to the course's credit weight. |
| 5 | Teaching Assistance at Educational Institutions (AMSP) | 2 | ≤20 | AMSP activities fulfilling the study load outside the study programme may be converted into several courses that have compatible PLOs and learning activity times corresponding to the course's credit weight. |
| 6 | Student Exchange | 2 | ≤20 | Can be converted into several courses that have PLO alignment and learning time |



| No | Form of Learning Activity | Can be carried out with credit points | | Notes |
|----|---|---------------------------------------|---|---|
| | | Regular | Fulfillment of Study Load Outside the Study Programme | |
| | | | | commensurate with the course's credit weight. |
| 7 | Research | 6 | ≤ 20 | Can be converted into several courses that have PLO equivalence and learning time commensurate with the course's credit weight. |
| 8 | Entrepreneurship | 10 | ≤ 20 | Entrepreneurial activities undertaken to fulfil the learning load outside the degree programme may be converted into several modules that have compatible PLOs and a duration of study that corresponds to the module's credit weight, including the Entrepreneurship module where applicable. |
| 9 | Independent Study (Multimedia Learning Materials Manager) | 10 | ≤ 20 | Can be converted into several courses that have PLO alignment and learning activity time commensurate with the course's credit weight. |
| 10 | Independent Study (Prototype Electronics and Programming) | 10 | ≤ 20 | Can be converted to several courses that have PLO equivalence and learning time commensurate with the course's credit weight. |
| 11 | Thematic Community Service | 10 | ≤ 20 | The Thematic Community Service Programme activity for fulfilling the study load outside the study programme, which is an extension of the Regular Community Service Programme, can be converted into several courses that have PLO alignment and learning activity time commensurate with the course credit weight. |



11.5 Curriculum Structure for Learning Activities Outside the Study Programme

Table 10.5 Curriculum Structure for Learning Activities Outside the Study Programme

| Semester | LEARNING PROGRAMMES WITHIN THE STUDY PROGRAMME | | | | | | | | EXTRA-CURRICULAR LEARNING PROGRAMME | | | | | | | | | | | | | | | | | | | | |
|----------|--|--|--|--|--|--|--|--|---|--|-----------------------------------|--|---|--|---|-----------------------------|--------------------------------|---------------------------|----------------------------------|----------------------------|-------------------------------|-----------------------------|--|---|---------------------------------------|---|---|---|---|
| | | | | | | | | | WIT HIN THE UNI VER SITY | OTH ER HIG HER EDU CAT ION INST ITU TIONS | NON-HIGHER EDUCATION INSTITUTIONS | | | | | | | | | | | | | | | | | | |
| VIII | Final Project | | | | | | | | | | | Community Service Programme – Digital Lite | Community Service Programme – Inclusive | Community Service Programme – Non-Formal | Teaching Assistant – Professional Development | Emotional & Social Learning | Innovation and Design Thinking | Effective Decision-Making | Creative and Innovative Thinking | Research and Data Literacy | Research and Digital Literacy | Research – Science Literacy | Entrepreneurship – Social Entrepreneurship | Entrepreneurship – Professional Development | Entrepreneurship – Talent Development | Entrepreneurship – Innovation and Design Thinking | Theatric Community Service Programme – Theatric | Theatric Community Service Programme – Theatric | Theatric Community Service Programme – Theatric |



| Semester | LEARNING PROGRAMMES WITHIN THE STUDY PROGRAMME | | | | | | | | EXTRA-CURRICULAR LEARNING PROGRAMME | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----------|--|--|--|--|--|--|--|--|---|--|---|---|---|---|--|--|---|--|--|--|--|--|---|---|---|------|-----------|--|---|--|------------------------|---|---|---|---|---|---|---|---|--|--|
| | | | | | | | | | WIT HIN THE UNI VER SITY | OTH ER HIG HER EDU CAT ION INST ITU TIONS | NON-HIGHER EDUCATION INSTITUTIONS | | | | | | | | | | | | | | g | nkin | (KK N) | Com munit y Dev elop ment | Ent repr ene uria l Con cept s | e – Talent De vel op ment | e – Field Survey | | | | | | | | | | |
| Credit | | | | | | | | | | | | | racy | Sol vin g in the Com munit y | and Exc lusi ve Lea ders hip | mal Edu cati on | | | | | | | | | | | | | | | | | | | | | | | | | |
| VII | | | | | | | | | Inter activ e Mult imed ia | | INT ER NS HIP - Curr icul um | INT ER NS HIP - Dev elop men | INT ER NS HIP - Dev elo pm | INT ER NS HIP - Tea chin g | 1. PC B Res earc h and | 1. Emb edde d Syst ems Prog ram | 1. Inter facin g 2. Mult imed ia | 1. Rob otics 2. Audi o- Visu al | Inde pen dent Stud y (Pro toty pe | Inde pen dent Stud y (Pro toty pe | Inde pend ent Stud y (Prot otyp e | Inde pend ent Stud y (Prot otyp e | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | 2 | 4 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 4 | 2 | 1 | 2 | 1 | | |



| No | Semester | Course Code | Course Name | Credit | PLO assigned to the course | | | | | | | | | | | Form of Fulfilment of Study Load Outside the Designated Study Programme | Notes |
|----|----------|-------------|-------------------------------------|--------|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|---|---|
| | | | | | PLO 1 | PLO 2 | PLO 3 | PLO 4 | PLO 5 | PLO 6 | PLO 7 | PLO 8 | PLO 9 | PLO 10 | PLO 11 | | |
| | | | | | | | | | | | | | | | | | the Educational Internship (P) activity. 3. Students carry out the activities in accordance with the instructions of the Educational Internship committee (D). 4. Students complete the forms that appear in SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D). 5. The supervising lecturer monitors the SPADA for the Fulfilment of Study Load Outside the Study Programme and the Course Logbook (C). 6. The Internship Supervisor monitors the outcomes of the student interns (C). 7. The Assessor for Fulfilment of Study Load Outside the Study Programme conducts an overall evaluation of student outcomes (C). |
| 2 | 7 | 3325324660 | Internship-Lesson Plans Development | 2 | √ | √ | | √ | | | √ | | | | | | Teaching Placement 1. Students must register with their department to participate in the educational placement (P). 2. Students must register for the Course Registration Form (KRS) for Coursework Outside the Programme of Study in SIMEKAR, selecting the Educational Internship (P) activity. 3. Students carry out the activities in accordance with the instructions of the Educational Internship committee (D). 4. Students complete the forms available on |



| No | Semester | Course Code | Course Name | Credit | PLO assigned to the course | | | | | | | | | | | Form of Fulfilment of Study Load Outside the Designated Study Programme | Notes |
|----|----------|-------------|---------------------------------------|--------|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|---|---|
| | | | | | PLO 1 | PLO 2 | PLO 3 | PLO 4 | PLO 5 | PLO 6 | PLO 7 | PLO 8 | PLO 9 | PLO 10 | PLO 11 | | |
| | | | | | | | | | | | | | | | | | <p>SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D).</p> <p>5. The supervising lecturer monitors the SPADA for Fulfilment of Study Load Outside the Study Programme and the Course Logbook (C).</p> <p>6. The Internship Supervisor monitors the outcomes of the student interns (C).</p> <p>7. The Assessor for Fulfilment of Study Load Outside the Study Programme conducts an overall evaluation of student outcomes (C).</p> |
| 3 | 7 | 3325324661 | INTERNSHIP-Learning Media Development | 2 | √ | √ | | √ | | | √ | | | | | | <p>Teaching Placement</p> <p>1. Students must register with their department to participate in the educational placement (P).</p> <p>2. Students must register for the Course Registration Form (KRS) for Coursework Outside the Degree Programme in SIMEKAR, selecting the Educational Internship (P) activity.</p> <p>3. Students carry out the activities in accordance with the instructions of the Educational Internship committee (D).</p> <p>4. Students complete the forms available on SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D).</p> <p>5. The supervising lecturer monitors the SPADA for the Fulfilment of Study Load Outside the Study Programme and the Course Logbook (C).</p> |



| No | Semester | Course Code | Course Name | Credit | PLO assigned to the course | | | | | | | | | | | Form of Fulfilment of Study Load Outside the Designated Study Programme | Notes |
|----|----------|-------------|------------------------------|--------|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|---|--|
| | | | | | PLO 1 | PLO 2 | PLO 3 | PLO 4 | PLO 5 | PLO 6 | PLO 7 | PLO 8 | PLO 9 | PLO 10 | PLO 11 | | |
| | | | | | | | | | | | | | | | | | 6. The Internship Supervisor monitors the outcomes of the student interns (C). 7. The Assessor for Fulfilment of Study Load Outside the Study Programme conducts an overall evaluation of student outcomes (C). |
| 4 | 7 | 3325344662 | Internship-Teaching Practice | 4 | √ | √ | | √ | | | | √ | | | | | Teaching Placement 1. Students must register with their department to participate in the educational placement (P). 2. Students must register for the Course Registration Form (KRS) for Coursework Outside the Degree Programme in SIMEKAR, selecting the Educational Internship (P) activity. 3. Students carry out the activities in accordance with the instructions of the Educational Internship committee (D). 4. Students complete the forms available on SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D). 5. The supervising lecturer monitors the SPADA for the Fulfilment of Study Load Outside the Study Programme and the Course Logbook (C). 6. The Internship Supervisor monitors the outcomes of the student interns (C). 7. The Assessor for Fulfilment of Study Load Outside the Study Programme conducts an overall evaluation of student outcomes (C). |
| 5 | 7 | 3325532663 | PCB Design | 3 | | | √ | | | | | | | √ | | Work/Industry | Conducted over 3 months, equivalent to 10 credits |



| No | Semester | Course Code | Course Name | Credit | PLO assigned to the course | | | | | | | | | | | Form of Fulfilment of Study Load Outside the Designated Study Programme | Notes |
|----|----------|-------------|--|--------|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|---|---|
| | | | | | PLO 1 | PLO 2 | PLO 3 | PLO 4 | PLO 5 | PLO 6 | PLO 7 | PLO 8 | PLO 9 | PLO 10 | PLO 11 | | |
| | | | | | | | | | | | | | | | | Placement Centre of Excellence in Electronics Prototyping and Programming | 1. Students must register with the programme to participate in the CoE Electronics Prototyping and Programming work placement/industrial placement (P). 2. Students must register for the 'Course Load Fulfilment Outside the Study Programme' module in SIMEKAR, selecting the CoE PMPM Work Placement/Industry Programme (P). 3. Students carry out the activities in accordance with the instructions of the CoE PMPM work placement/industrial placement committee (D). 4. Students complete the forms that appear in SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D). 5. The supervising lecturer monitors the SPADA for Fulfilment of Study Load Outside the Study Programme and the Course Logbook (C). 6. The Internship Supervisor monitors the outcomes of the student interns (C). 7. The assessor for the fulfilment of study load outside the study programme conducts an overall evaluation of student outcomes (C). |
| | 7 | 3325532664 | Multimedia Project Design and Research | | | √ | | | | | | | | √ | | Work/Industry Placement at the Centre of Excellence for | Conducted over 3 months, equivalent to 10 credits 1. Students must register with the programme to participate in the CoE Electronics Prototyping and Programming (P) work placement/industrial |



| No | Semester | Course Code | Course Name | Credit | PLO assigned to the course | | | | | | | | | | | Form of Fulfilment of Study Load Outside the Designated Study Programme | Notes |
|----|----------|-------------|------------------------------|--------|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|---|--|
| | | | | | PLO 1 | PLO 2 | PLO 3 | PLO 4 | PLO 5 | PLO 6 | PLO 7 | PLO 8 | PLO 9 | PLO 10 | PLO 11 | | |
| | | | | | | | | | | | | | | | | PMPM | <p>placement.</p> <p>2. Students must register for the 'Course Load Fulfilment Outside the Study Programme' module in SIMEKAR, selecting the CoE PMPM Work/Industry Placement activity (P).</p> <p>3. Students carry out the activities in accordance with the instructions of the CoE PMPM work placement/industrial placement committee (D).</p> <p>4. Students complete the forms that appear in SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D).</p> <p>5. The supervising lecturer monitors the SPADA for the Fulfilment of Study Load Outside the Study Programme and the Course Logbook (C).</p> <p>6. The Internship Supervisor monitors the outcomes of the student interns (C).</p> <p>7. The assessor for the fulfilment of study load outside the study programme conducts an overall evaluation of student outcomes (C).</p> |
| 6 | 7 | 3325532665 | Embedded Systems Programming | 3 | | | √ | | | | | | √ | √ | | <p>Work Placement/Industry CoE Electronics Prototyping and Programming</p> <p>Conducted over 3 months, equivalent to 10 credits</p> <p>1. Students must register with the programme to participate in the CoE Electronics Prototyping and Programming work placement/industrial placement (P).</p> <p>2. Students must register for the 'Course Load Fulfilment Outside the Study Programme' module</p> | |



| No | Semester | Course Code | Course Name | Credit | PLO assigned to the course | | | | | | | | | | | Form of Fulfilment of Study Load Outside the Designated Study Programme | Notes |
|----|----------|-------------|---|--------|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|---|---|
| | | | | | PLO 1 | PLO 2 | PLO 3 | PLO 4 | PLO 5 | PLO 6 | PLO 7 | PLO 8 | PLO 9 | PLO 10 | PLO 11 | | |
| | | | | | | | | | | | | | | | | | <p>in SIMEKAR, selecting the CoE PMPM Work Placement/Industry Programme (P).</p> <p>3. Students carry out the activities in accordance with the instructions of the CoE PMPM work placement/industrial placement committee (D).</p> <p>4. Students complete the forms that appear in SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D).</p> <p>5. The supervising lecturer monitors the SPADA for the Fulfilment of Study Load Outside the Study Programme and the Course Logbook (C).</p> <p>6. The Internship Supervisor monitors the outcomes of the student interns (C).</p> <p>7. The assessor for the fulfilment of study load outside the study programme conducts an overall evaluation of student outcomes (C).</p> |
| | 7 | 3325532666 | Digital Visual Development and Storytelling | | | √ | | | | | | | | √ | | | <p>Work Placement/Industry CoE PMPM</p> <p>Conducted over 3 months, equivalent to 10 credits</p> <p>1. Students must register with the programme to participate in the CoE Electronics Prototyping and Programming (P) work placement/industrial placement.</p> <p>2. Students must register for the ‘Course Load Fulfilment Outside the Study Programme’ module in SIMEKAR, selecting the CoE PMPM Work/Industry Placement activity (P).</p> <p>3. Students carry out the activities in accordance</p> |



| No | Semester | Course Code | Course Name | Credit | PLO assigned to the course | | | | | | | | | | | Form of Fulfilment of Study Load Outside the Designated Study Programme | Notes |
|----|----------|-------------|--------------------|--------|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|--------|---|---|--|
| | | | | | PLO 1 | PLO 2 | PLO 3 | PLO 4 | PLO 5 | PLO 6 | PLO 7 | PLO 8 | PLO 9 | PLO 10 | PLO 11 | | |
| | | | | | | | | | | | | | | | | | with the instructions of the CoE PMPM work placement/industrial placement committee (D). 4. Students complete the forms that appear in SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D). 5. The supervising lecturer monitors the SPADA for the Fulfilment of Study Load Outside the Study Programme and the Course Logbook (C). 6. The Internship Supervisor monitors the outcomes of the student interns (C). 7. The assessor for the fulfilment of study load outside the study programme conducts an overall evaluation of student outcomes (C). |
| 7 | 7 | 3325522667 | System Interfacing | 2 | | | √ | | | | | | | √ | Work/Industry Placement Centre of Excellence in Electronics Prototyping and Programming | Conducted over 3 months, equivalent to 10 credits 1. Students must register with the programme to participate in the CoE Electronics Prototyping and Programming work placement/industrial placement (P). 2. Students must register for the Course Registration Form (KRS) for Study Load Fulfilment Outside the Degree Programme in SIMEKAR, specifying the CoE PMPM (P) work placement/industrial placement. 3. Students carry out activities in accordance with the instructions of the CoE PMPM work placement/industrial placement committee (D). | |



| No | Semester | Course Code | Course Name | Credit | PLO assigned to the course | | | | | | | | | | | Form of Fulfilment of Study Load Outside the Designated Study Programme | Notes |
|----|----------|-------------|--|--------|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|---|---|
| | | | | | PLO 1 | PLO 2 | PLO 3 | PLO 4 | PLO 5 | PLO 6 | PLO 7 | PLO 8 | PLO 9 | PLO 10 | PLO 11 | | |
| | | | | | | | | | | | | | | | | | <p>4. Students complete the forms that appear in SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D).</p> <p>5. The supervising lecturer monitors the SPADA for the Fulfilment of Study Load Outside the Study Programme and the Course Logbook (C).</p> <p>6. The Internship Supervisor monitors the outcomes of the student interns (C).</p> <p>7. The assessor for the fulfilment of study load outside the study programme conducts an overall evaluation of student outcomes (C).</p> |
| | 7 | 3325522668 | Multimedia Asset Design and Production | | | √ | | | | | | | | √ | | | <p>Work/Industry Placement at the Centre of Excellence (CoE) PMPM</p> <p>Conducted over 3 months, equivalent to 10 credits</p> <p>1. Students must register with the programme to participate in the CoE Electronics Prototyping and Programming (P) work placement/industrial placement.</p> <p>2. Students must register for the 'Course Load Fulfilment Outside the Study Programme' module in SIMEKAR, selecting the CoE PMPM Work/Industry Placement activity (P).</p> <p>3. Students carry out the activities in accordance with the instructions of the CoE PMPM work placement/industrial placement committee (D).</p> <p>4. Students complete the forms that appear in SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D).</p> |



| No | Semester | Course Code | Course Name | Credit | PLO assigned to the course | | | | | | | | | | | Form of Fulfilment of Study Load Outside the Designated Study Programme | Notes |
|----|----------|-------------|-------------|--------|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|---|--|
| | | | | | PLO 1 | PLO 2 | PLO 3 | PLO 4 | PLO 5 | PLO 6 | PLO 7 | PLO 8 | PLO 9 | PLO 10 | PLO 11 | | |
| | | | | | | | | | | | | | | | | | <p>5. The supervising lecturer monitors the SPADA for Fulfilment of Study Load Outside the Study Programme and the Course Logbook (C).</p> <p>6. The Internship Supervisor monitors the outcomes of the student interns (C).</p> <p>7. The assessor for the fulfilment of study load outside the study programme conducts an overall evaluation of student outcomes (C).</p> |
| 8 | 7 | 3325522669 | Robotics | 2 | | | √ | | | | | | | √ | | <p>Work/Industry Placement Centre of Excellence in Electronics Prototyping and Programming</p> <p>Conducted over 3 months, equivalent to 10 credits</p> <ol style="list-style-type: none"> Students must register with the programme to participate in the CoE Electronics Prototyping and Programming work placement/industrial placement (P). Students must register for the 'Course Load Fulfilment Outside the Study Programme' module in SIMEKAR, selecting the CoE PMPM work placement/industrial placement activity (P). Students carry out the activities in accordance with the instructions of the CoE PMPM work placement/industrial placement committee (D). Students complete the forms that appear in SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D). The supervising lecturer monitors the SPADA for Fulfilment of Study Load Outside the Study Programme and the Course Logbook (C). | |



| No | Semester | Course Code | Course Name | Credit | PLO assigned to the course | | | | | | | | | | | Form of Fulfilment of Study Load Outside the Designated Study Programme | Notes |
|----|----------|-------------|--|--------|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|---|--|
| | | | | | PLO 1 | PLO 2 | PLO 3 | PLO 4 | PLO 5 | PLO 6 | PLO 7 | PLO 8 | PLO 9 | PLO 10 | PLO 11 | | |
| | | | | | | | | | | | | | | | | | 6. The Internship Supervisor monitors the outcomes of the student interns (C). 7. The assessor for the fulfilment of study load outside the study programme conducts an overall evaluation of student outcomes (C). |
| | 7 | 3325522670 | Audio-Visual Integration in Multimedia | | | √ | | | | | | | √ | | | | <p>Work Placement/Industry CoE PMPM</p> <p>Conducted over 3 months, equivalent to 10 credits</p> <ol style="list-style-type: none"> Students must register with the programme to participate in the CoE Electronics Prototyping and Programming (P) work placement/industrial placement. Students must register for the 'Course Load Fulfilment Outside the Study Programme' module in SIMEKAR, selecting the CoE PMPM Work/Industry Placement activity (P). Students carry out the activities in accordance with the instructions of the CoE PMPM work placement/industrial placement committee (D). Students complete the forms that appear in SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D). The supervising lecturer monitors the SPADA for Fulfilment of Study Load Outside the Study Programme and the Course Logbook (C). The Internship Supervisor monitors the outcomes of the student interns (C). The assessor for the fulfilment of study load |



| No | Semester | Course Code | Course Name | Credit | PLO assigned to the course | | | | | | | | | | | Form of Fulfilment of Study Load Outside the Designated Study Programme | Notes |
|----|----------|-------------|--|--------|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|---|---|
| | | | | | PLO 1 | PLO 2 | PLO 3 | PLO 4 | PLO 5 | PLO 6 | PLO 7 | PLO 8 | PLO 9 | PLO 10 | PLO 11 | | |
| | | | | | | | | | | | | | | | | | outside the study programme conducts an overall evaluation of student outcomes (C). |
| 9 | 8 | 3325241613 | Community Service-Problem Solving in the Community | 4 | √ | | | | | | | √ | | | √ | Thematic Community Service Programme at the UPGRIS | Organised by the Community Service Centre of the UPGRIS Conducted over a period of approximately 3 months Conversion of 10 credits 1. Students must register with their department to participate in the Thematic Community Service Programme of the UPGRIS (P). 2. Students must register for the 'Course Load Fulfilment Outside the Study Programme' module in SIMEKAR, selecting the Thematic Community Service Programme of the UPGRIS (P). 3. Students carry out the activities in accordance with the instructions of the University of Teachers of the Republic of Indonesia, Semarang Thematic Community Service Programme committee (D). 4. Students complete the forms that appear in SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D). 5. The supervising lecturer monitors the SPADA for the Fulfilment of Study Load Outside the Study Programme and the Course Logbook (C). |
| 10 | 8 | 3325221614 | Community Service Programme-Digital | 2 | √ | | | | | | | √ | | | √ | Thematic Community Service | Organised by the Community Service Centre of the UPGRIS |



| No | Semester | Course Code | Course Name | Credit | PLO assigned to the course | | | | | | | | | | | Form of Fulfilment of Study Load Outside the Designated Study Programme | Notes |
|----|----------|-------------|--|--------|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|---|--|
| | | | | | PLO 1 | PLO 2 | PLO 3 | PLO 4 | PLO 5 | PLO 6 | PLO 7 | PLO 8 | PLO 9 | PLO 10 | PLO 11 | | |
| | | | Literacy | | | | | | | | | | | | | Programme of the UPGRIS | <p>Conducted over a period of approximately 3 months</p> <p>Conversion of 10 credits</p> <p>1. Students must register with their department to participate in the Thematic Community Service Programme of the UPGRIS (P).</p> <p>2. Students must register for the Course Registration Form (KRS) for Study Load Fulfilment Outside the Degree Programme in SIMEKAR, specifying the Thematic Community Service Programme (KKN) of the UPGRIS (P).</p> <p>3. Students carry out activities in accordance with the instructions of the Thematic Community Service Programme committee of the UPGRIS (D).</p> <p>4. Students complete the forms that appear in SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D).</p> <p>5. The supervising lecturer monitors the SPADA for the Fulfilment of Study Load Outside the Study Programme and the Course Logbook (C).</p> |
| 11 | 8 | 3325221615 | Community Service Programme–Inclusive and Exclusive Leadership | 2 | √ | | | | | | | | √ | | √ | <p>Thematic Community Service Programme (KKN) of the UPGRIS</p> <p>Organised by the Community Service Centre of the UPGRIS</p> <p>Conducted over a period of approximately 3 months</p> <p>Conversion of 10 credits</p> | |



| No | Semester | Course Code | Course Name | Credit | PLO assigned to the course | | | | | | | | | | | Form of Fulfilment of Study Load Outside the Designated Study Programme | Notes |
|----|----------|-------------|---|--------|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|---|--|
| | | | | | PLO 1 | PLO 2 | PLO 3 | PLO 4 | PLO 5 | PLO 6 | PLO 7 | PLO 8 | PLO 9 | PLO 10 | PLO 11 | | |
| | | | | | | | | | | | | | | | | | <ol style="list-style-type: none"> Students must register with their department to participate in the Thematic Community Service Programme of the UPGRIS (P). Students must register for the 'Course Load Fulfilment Outside the Study Programme' module in SIMEKAR, selecting the Thematic Community Service Programme of the UPGRIS (P). Students carry out the activities in accordance with the instructions of the University of Teachers of the Republic of Indonesia, Semarang Thematic Community Service Programme committee (D). Students complete the forms that appear in SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D). The supervising lecturer monitors the SPADA for the Fulfilment of Study Load Outside the Study Programme and the Course Logbook (C). |
| 12 | 8 | 3325221616 | Community Service Programme -Non-Formal Education | 2 | √ | | | | | | | √ | | | √ | Thematic Community Service Programme of the UPGRIS Organised by the Community Service Centre of the UPGRIS Conducted over a period of approximately 3 months Conversion of 10 credits <ol style="list-style-type: none"> Students must register with their department to participate in the Thematic Community Service Programme of the UPGRIS (P). Students must register for the 'Course Load | |



| No | Semester | Course Code | Course Name | Credit | PLO assigned to the course | | | | | | | | | | | Form of Fulfilment of Study Load Outside the Designated Study Programme | Notes |
|----|----------|-------------|--------------------------|--------|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|---|--|
| | | | | | PLO 1 | PLO 2 | PLO 3 | PLO 4 | PLO 5 | PLO 6 | PLO 7 | PLO 8 | PLO 9 | PLO 10 | PLO 11 | | |
| | | | | | | | | | | | | | | | | | <p>Fulfilment Outside the Study Programme' module in SIMEKAR, selecting the Thematic Community Service Programme of the UPGRIS (P).</p> <p>3. Students carry out the activities in accordance with the instructions of the University of Teachers of the Republic of Indonesia, Semarang Thematic Community Service Programme committee (D).</p> <p>4. Students complete the forms that appear in SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D).</p> <p>5. The supervising lecturer monitors the SPADA for the Fulfilment of Study Load Outside the Study Programme and the Course Logbook (C).</p> |
| | 7/8 | BB24121602 | Professional Development | 2 | √ | √ | | √ | | | √ | | | | | | <p>Teaching Assistance</p> <p>Conducted over 3 months Converted to 10 credits</p> <p>1. Students must register with their department to participate in the Teaching Assistance (P) programme.</p> <p>2. Students must register for the Course Registration Form (KRS) for Coursework Outside the Programme of Study in SIMEKAR, selecting the Teaching Assistance (P) activity.</p> <p>3. Students carry out the activities in accordance with the instructions of the Teaching Assistance committee (D).</p> <p>4. Students complete the forms that appear in</p> |



| No | Semester | Course Code | Course Name | Credit | PLO assigned to the course | | | | | | | | | | | Form of Fulfilment of Study Load Outside the Designated Study Programme | Notes |
|----|----------|-------------|-----------------------------|--------|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|---|---|
| | | | | | PLO 1 | PLO 2 | PLO 3 | PLO 4 | PLO 5 | PLO 6 | PLO 7 | PLO 8 | PLO 9 | PLO 10 | PLO 11 | | |
| | | | | | | | | | | | | | | | | | <p>SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D).</p> <p>5. The supervising lecturer monitors the SPADA for Fulfilment of Study Load Outside the Study Programme and the Course Logbook (C).</p> <p>6. The Academic Supervisor monitors student outcomes (C).</p> <p>7. The Assessor for Fulfilment of Study Load Outside the Study Programme conducts an overall evaluation of student outcomes (C).</p> |
| | 7/8 | BB24121603 | Emotional & Social Learning | 2 | √ | √ | | √ | | | √ | | | | | | <p>Teaching Assistance</p> <p>Conducted over 3 months Converted to 10 credits</p> <ol style="list-style-type: none"> Students must register with the programme to participate in the Teaching Assistance (P) activity. Students must register for the Course Registration Form (KRS) for Coursework Outside the Programme of Study in SIMEKAR, selecting the Teaching Assistance (P) activity. Students carry out the activities in accordance with the instructions of the Teaching Assistance committee (D). Students complete the forms that appear in SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D). The supervising lecturer monitors the SPADA for Fulfilment of Study Load Outside the Study |



| No | Semester | Course Code | Course Name | Credit | PLO assigned to the course | | | | | | | | | | | Form of Fulfilment of Study Load Outside the Designated Study Programme | Notes |
|----|----------|-------------|--------------------------------|--------|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|---|---|
| | | | | | PLO 1 | PLO 2 | PLO 3 | PLO 4 | PLO 5 | PLO 6 | PLO 7 | PLO 8 | PLO 9 | PLO 10 | PLO 11 | | |
| | | | | | | | | | | | | | | | | | <p>Programme and the Course Logbook (C).</p> <p>6. The Academic Supervisor monitors student outcomes (C).</p> <p>7. The Assessor for Fulfilment of Study Load Outside the Study Programme conducts an overall evaluation of student outcomes (C).</p> |
| | 7/8 | BB24121609 | Innovation and Design Thinking | 2 | √ | √ | | √ | | | √ | | | | | | <p>Teaching Assistance</p> <p>Conducted over 3 months Converted to 10 credits</p> <ol style="list-style-type: none"> Students must register with their department to participate in the Teaching Assistance (P) programme. Students must register for the Course Registration Form (KRS) for Course Load Fulfilment Outside the Degree Programme in SIMEKAR, selecting the Teaching Assistance (P) activity. Students carry out the activities in accordance with the instructions of the Teaching Assistance committee (D). Students complete the forms that appear in SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D). The supervising lecturer monitors the SPADA for Fulfilment of Study Load Outside the Study Programme and the Course Logbook (C). The Academic Supervisor monitors student |



| No | Semester | Course Code | Course Name | Credit | PLO assigned to the course | | | | | | | | | | | Form of Fulfilment of Study Load Outside the Designated Study Programme | Notes |
|----|----------|-------------|---------------------------|--------|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|---|--|
| | | | | | PLO 1 | PLO 2 | PLO 3 | PLO 4 | PLO 5 | PLO 6 | PLO 7 | PLO 8 | PLO 9 | PLO 10 | PLO 11 | | |
| | | | | | | | | | | | | | | | | | <p>outcomes (C).</p> <p>7. The Assessor for Fulfilment of Study Load Outside the Study Programme conducts an overall evaluation of student outcomes (C).</p> |
| | 7/8 | BB24121613 | Effective Decision-Making | 2 | √ | √ | | √ | | | √ | | | | | | <p>Teaching Assistance</p> <p>Conducted over 3 months Converted to 10 credits</p> <ol style="list-style-type: none"> Students must register with the programme to participate in the Teaching Assistance (P) activity. Students must register for the Course Registration Form (KRS) for Coursework Outside the Programme of Study in SIMEKAR, selecting the Teaching Assistance (P) activity. Students carry out the activities in accordance with the instructions of the Teaching Assistance committee (D). Students complete the forms that appear in SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D). The supervising lecturer monitors the SPADA for Fulfilment of Study Load Outside the Study Programme and the Course Logbook (C). The Academic Supervisor monitors student outcomes (C). The Assessor for Fulfilment of Study Load Outside the Study Programme conducts an overall evaluation of student outcomes (C). |



| No | Semester | Course Code | Course Name | Credit | PLO assigned to the course | | | | | | | | | | | Form of Fulfilment of Study Load Outside the Designated Study Programme | Notes |
|----|----------|-------------|----------------------------------|--------|----------------------------|-----|-----|-----|-----|-----|-----|-----|-----|------|------------------|---|--|
| | | | | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | | |
| | 7/8 | BB24121616 | Creative and Innovative Thinking | 2 | √ | √ | | √ | | | √ | | | | | Teaching Assistance | <p>Conducted over 3 months Converted to 10 credits</p> <ol style="list-style-type: none"> 1. Students must register with the programme to participate in the Teaching Assistance (P) activity. 2. Students must register for the Course Registration Form (KRS) for Coursework Outside the Programme of Study in SIMEKAR, selecting the Teaching Assistance (P) activity. 3. Students carry out the activities in accordance with the instructions of the Teaching Assistance committee (D). 4. Students complete the forms that appear in SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D). 5. The supervising lecturer monitors the SPADA for Course Load Fulfilment Outside the Study Programme and the Course Logbook (C). 6. The Academic Supervisor monitors student outcomes (C). 7. The Assessor for Fulfilment of Study Load Outside the Study Programme conducts an overall evaluation of student outcomes (C). |
| | 7/8 | 3425422662 | Interactive Multimedia | 2 | √ | √ | | | | √ | √ | √ | | | Student Exchange | <p>This activity must be recorded in http://bursakmm.ildikti6.id Conducted over a full semester Converted according to the courses taken by the</p> | |



| No | Semester | Course Code | Course Name | Credit | PLO assigned to the course | | | | | | | | | | | Form of Fulfilment of Study Load Outside the Designated Study Programme | Notes |
|----|----------|-------------|---------------|--------|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|---|--|
| | | | | | PLO 1 | PLO 2 | PLO 3 | PLO 4 | PLO 5 | PLO 6 | PLO 7 | PLO 8 | PLO 9 | PLO 10 | PLO 11 | | |
| | | | | | | | | | | | | | | | | | <p>student</p> <ol style="list-style-type: none"> Students must register with their department to participate in the PURWAKA (P) programme. Students must complete the Course Registration Form for Study Load Fulfilment Outside the Programme of Study in SIMEKAR, selecting the PURWAKA (P) activity. Students carry out the activity in accordance with the instructions of the PURWAKA committee (D). Students complete the forms that appear in SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D). The supervising lecturer monitors the SPADA for the Fulfilment of Study Load Outside the Study Programme and the Course Logbook (C). The academic supervisor monitors student outcomes (C). The Assessor for Fulfilment of Study Load Outside the Study Programme conducts an overall evaluation of student outcomes (C). |
| | 7/8 | BB24121627 | Data Literacy | 2 | √ | √ | √ | √ | √ | √ | | | | | | | <p>Research</p> <p>Students participate as members in lecturers' research</p> <p>Conversion of 6 credits</p> <ol style="list-style-type: none"> Students must register with their department to participate in the Faculty Research (P) |



| No | Semester | Course Code | Course Name | Credit | PLO assigned to the course | | | | | | | | | | | Form of Fulfilment of Study Load Outside the Designated Study Programme | Notes |
|----|----------|-------------|------------------|--------|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|---|--|
| | | | | | PLO 1 | PLO 2 | PLO 3 | PLO 4 | PLO 5 | PLO 6 | PLO 7 | PLO 8 | PLO 9 | PLO 10 | PLO 11 | | |
| | | | | | | | | | | | | | | | | | <p>programme.</p> <p>2. Students must register for the Course Registration Form (KRS) for Coursework Outside the Degree Programme in SIMEKAR, selecting the Faculty Research (P) activity.</p> <p>3. Students carry out the activities in accordance with the instructions of the Faculty Research Committee (D).</p> <p>4. Students complete the forms that appear in SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D).</p> <p>5. The supervising lecturer monitors the SPADA for Fulfilment of Study Load Outside the Study Programme and the Course Logbook (C).</p> <p>6. The Internship Supervisor monitors student outcomes (C).</p> <p>7. The Assessor for Fulfilment of Study Load Outside the Study Programme conducts an overall evaluation of student outcomes (C).</p> |
| | 7/8 | BB24121628 | Digital Literacy | 2 | √ | √ | √ | √ | √ | √ | √ | | | | | | <p>Research</p> <p>Students participate as members in lecturers' research</p> <p>Conversion of 6 credits</p> <p>1. Students must register with their department to participate in the Faculty Research (P) programme.</p> <p>2. Students must register for the Course</p> |



| No | Semester | Course Code | Course Name | Credit | PLO assigned to the course | | | | | | | | | | | Form of Fulfilment of Study Load Outside the Designated Study Programme | Notes |
|----|----------|-------------|------------------|--------|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|---|---|
| | | | | | PLO 1 | PLO 2 | PLO 3 | PLO 4 | PLO 5 | PLO 6 | PLO 7 | PLO 8 | PLO 9 | PLO 10 | PLO 11 | | |
| | | | | | | | | | | | | | | | | | <p>Registration Form (KRS) for Coursework Outside the Programme of Study in SIMEKAR, selecting the Faculty Research (P) activity.</p> <p>3. Students carry out the activities in accordance with the instructions of the Faculty Research Committee (D).</p> <p>4. Students complete the forms that appear in SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D).</p> <p>5. The supervising lecturer monitors the SPADA for Fulfilment of Study Load Outside the Study Programme and the Course Logbook (C).</p> <p>6. The Internship Supervisor monitors student outcomes (C).</p> <p>7. The Assessor for Fulfilment of Study Load Outside the Study Programme conducts an overall evaluation of student outcomes (C).</p> |
| | 7/8 | BB24121632 | Science Literacy | 2 | √ | √ | √ | √ | √ | √ | √ | | | | | | <p>Research</p> <p>Students participate as members in lecturers' research</p> <p>Conversion of 6 credits</p> <p>1. Students must register with their department to participate in the Faculty Research (P) programme.</p> <p>2. Students must register for the Course Registration Form (KRS) for Academic Load Fulfilment Outside the Study Programme in</p> |



| No | Semester | Course Code | Course Name | Credit | PLO assigned to the course | | | | | | | | | | | Form of Fulfilment of Study Load Outside the Designated Study Programme | Notes |
|----|----------|-------------|-------------------------|--------|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|---|--|
| | | | | | PLO 1 | PLO 2 | PLO 3 | PLO 4 | PLO 5 | PLO 6 | PLO 7 | PLO 8 | PLO 9 | PLO 10 | PLO 11 | | |
| | | | | | | | | | | | | | | | | | <p>SIMEKAR, selecting the Faculty Research (P) activity.</p> <p>3. Students carry out the activities in accordance with the instructions of the Faculty Research Committee (D).</p> <p>4. Students complete the forms that appear in SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D).</p> <p>5. The supervising lecturer monitors the SPADA for Fulfilment of Study Load Outside the Programme and the Course Logbook (C).</p> <p>6. The Internship Supervisor monitors student outcomes (C).</p> <p>7. The Assessor for Fulfilment of Study Load Outside the Study Programme conducts an overall evaluation of student outcomes (C).</p> |
| | 7/8 | BB24121605 | Social Entrepreneurship | 2 | √ | | | | | | | | | | √ | Entrepreneurship | <p>Organised by LLDIKTI VI</p> <p>Conducted over a full semester</p> <p>Conversion: 20 credits</p> <p>1. Students must register with their department to participate in the MAHARDEKA (P) programme.</p> <p>2. Students must register for the Course Registration Form (KRS) for Coursework Outside the Degree Programme in SIMEKAR, selecting the MAHARDEKA (P) activity.</p> <p>3. Students carry out the activities in accordance</p> |



| No | Semester | Course Code | Course Name | Credit | PLO assigned to the course | | | | | | | | | | | Form of Fulfilment of Study Load Outside the Designated Study Programme | Notes |
|----|----------|-------------|--------------------------|--------|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|---|--|
| | | | | | PLO 1 | PLO 2 | PLO 3 | PLO 4 | PLO 5 | PLO 6 | PLO 7 | PLO 8 | PLO 9 | PLO 10 | PLO 11 | | |
| | | | | | | | | | | | | | | | | | with the instructions of the MAHARDEKA committee (D). 4. Students complete the forms that appear in SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D). 5. The supervising lecturer monitors the SPADA for Fulfilment of Study Load Outside the Study Programme and the Course Logbook (C). 6. The academic supervisor monitors student outcomes (C). 7. The Assessor for Fulfilment of Study Load Outside the Study Programme conducts an overall evaluation of student outcomes (C). |
| | 7/8 | BB24121602 | Professional Development | 2 | √ | | | | | | | | | | | √ | Entrepreneurship Organised by LLDIKTI VI Conducted over a full semester Conversion: 20 credits 1. Students must register with their department to participate in the MAHARDEKA (P) programme. 2. Students must register for the Course Registration Form (KRS) for Coursework Outside the Degree Programme in SIMEKAR, selecting the MAHARDEKA (P) activity. 3. Students carry out the activities in accordance with the instructions of the MAHARDEKA committee (D). 4. Students complete the forms that appear in |



| No | Semester | Course Code | Course Name | Credit | PLO assigned to the course | | | | | | | | | | | Form of Fulfilment of Study Load Outside the Designated Study Programme | Notes |
|----|----------|-------------|--------------------|--------|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|---|--|
| | | | | | PLO 1 | PLO 2 | PLO 3 | PLO 4 | PLO 5 | PLO 6 | PLO 7 | PLO 8 | PLO 9 | PLO 10 | PLO 11 | | |
| | | | | | | | | | | | | | | | | | <p>SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D).</p> <p>5. The supervising lecturer monitors the SPADA for Fulfilment of Study Load Outside the Study Programme and the Course Logbook (C).</p> <p>6. The academic supervisor monitors student outcomes (C).</p> <p>7. The Assessor for Fulfilment of Study Load Outside the Study Programme conducts an overall evaluation of student outcomes (C).</p> |
| | 7/8 | BB24121606 | Talent Development | 2 | √ | | | | | | | | | | √ | Entrepreneurship | <p>Organised by LLDIKTI VI</p> <p>Conducted over a full semester</p> <p>Conversion: 20 credits</p> <p>1. Students must register with their department to participate in the MAHARDEKA (P) programme.</p> <p>2. Students must register for the Course Registration Form (KRS) for Coursework Outside the Programme of Study in SIMEKAR, selecting the MAHARDEKA (P) activity.</p> <p>3. Students carry out the activities in accordance with the instructions of the MAHARDEKA committee (D).</p> <p>4. Students complete the forms that appear in SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D).</p> <p>5. The course lecturer monitors the SPADA</p> |



| No | Semester | Course Code | Course Name | Credit | PLO assigned to the course | | | | | | | | | | | Form of Fulfilment of Study Load Outside the Designated Study Programme | Notes |
|----|----------|-------------|--------------------------------|--------|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|---|---|
| | | | | | PLO 1 | PLO 2 | PLO 3 | PLO 4 | PLO 5 | PLO 6 | PLO 7 | PLO 8 | PLO 9 | PLO 10 | PLO 11 | | |
| | | | | | | | | | | | | | | | | | system for the fulfilment of study load requirements outside the degree programme and the course logbook (C). 6. The Academic Tutor monitors student outcomes (C). 7. The assessor for the fulfilment of study load requirements outside the degree programme conducts an overall evaluation of student outcomes (C). |
| | 7/8 | BB24121609 | Innovation and Design Thinking | 2 | √ | | | | | | | | | | √ | Entrepreneurship | Organised by LLDIKTI VI Conducted over a full semester Conversion: 20 credits 1. Students must register with their department to participate in the MAHARDEKA (P) programme. 2. Students must register for the Course Registration Form (KRS) for Coursework Outside the Degree Programme in SIMEKAR, selecting the MAHARDEKA (P) activity. 3. Students carry out the activities in accordance with the instructions of the MAHARDEKA committee (D). 4. Students complete the forms that appear in SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D). 5. The supervising lecturer monitors the SPADA for Fulfilment of Study Load Outside the Study |



| No | Semester | Course Code | Course Name | Credit | PLO assigned to the course | | | | | | | | | | | Form of Fulfilment of Study Load Outside the Designated Study Programme | Notes |
|----|----------|-------------|----------------------------------|--------|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|---|--|
| | | | | | PLO 1 | PLO 2 | PLO 3 | PLO 4 | PLO 5 | PLO 6 | PLO 7 | PLO 8 | PLO 9 | PLO 10 | PLO 11 | | |
| | | | | | | | | | | | | | | | | | Programme and the Course Logbook (C). 6. The academic supervisor monitors student outcomes (C). 7. The Assessor for Fulfilment of Study Load Outside the Study Programme conducts an overall evaluation of student outcomes (C). |
| | 7/8 | BB24121616 | Creative and Innovative Thinking | 2 | √ | | | | | | | | | | √ | Entrepreneurship | Organised by LLDIKTI VI Conducted over a full semester Conversion: 20 credits 1. Students must register with their department to participate in the MAHARDEKA (P) programme. 2. Students must register for the Course Registration Form (KRS) for Coursework Outside the Degree Programme in SIMEKAR, selecting the MAHARDEKA (P) activity. 3. Students carry out the activities in accordance with the instructions of the MAHARDEKA committee (D). 4. Students complete the forms that appear in SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D). 5. The supervising lecturer monitors the SPADA for Fulfilment of Study Load Outside the Study Programme and the Course Logbook (C). 6. The academic supervisor monitors student outcomes (C). |



| No | Semester | Course Code | Course Name | Credit | PLO assigned to the course | | | | | | | | | | | Form of Fulfilment of Study Load Outside the Designated Study Programme | Notes |
|----|----------|-------------|--|--------|----------------------------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|---|--|
| | | | | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | | |
| | | | | | | | | | | | | | | | | | 7. The Assessor for Fulfilment of Study Load Outside the Study Programme conducts an overall evaluation of student outcomes (C). |
| | 7/8 | 3325532664 | Multimedia Project Design and Research | 3 | | √ | | | | | √ | √ | √ | | | | <p>Organised by the Ministry of Education, Culture, Research and Technology</p> <p>Conducted over one full semester</p> <p>Equivalent to 20 credits</p> <p>1. Students must register with their department to participate in the certified internship programme (P).</p> <p>2. Students must register for the Course Registration Form (KRS) for Coursework Outside the Programme of Study in SIMEKAR, selecting the certified internship (P) activity.</p> <p>3. Students carry out the activities in accordance with the instructions of the certified internship committee (D).</p> <p>4. Students complete the forms that appear in SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D).</p> <p>5. The supervising lecturer monitors the SPADA for Fulfilment of Study Load Outside the Study Programme and the Course Logbook (C).</p> <p>6. The Internship Supervisor monitors the outcomes of the student interns (C).</p> <p>7. The Assessor for Fulfilment of Study Load</p> |



| No | Semester | Course Code | Course Name | Credit | PLO assigned to the course | | | | | | | | | | | Form of Fulfilment of Study Load Outside the Designated Study Programme | Notes |
|----|----------|-------------|---|--------|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|---|---|
| | | | | | PLO 1 | PLO 2 | PLO 3 | PLO 4 | PLO 5 | PLO 6 | PLO 7 | PLO 8 | PLO 9 | PLO 10 | PLO 11 | | |
| | | | | | | | | | | | | | | | | | Outside the Study Programme conducts an overall evaluation of student outcomes (C). |
| | 7/8 | 3325532666 | Digital Visual Development and Storytelling | 3 | | √ | | | | | | √ | √ | √ | | | <p>Independent Study (Multimedia Learning Materials Manager)</p> <p>Organised by the Ministry of Education, Culture, Research and Technology</p> <p>Conducted over one full semester</p> <p>Equivalent to 20 credits</p> <ol style="list-style-type: none"> Students must register with their department to participate in the certified internship programme (P). Students must register for the Course Registration Form (KRS) for Coursework Outside the Programme of Study in SIMEKAR, selecting the certified internship (P) activity. Students carry out the activities in accordance with the instructions of the certified internship committee (D). Students complete the forms generated in SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D). The supervising lecturer monitors the SPADA for Fulfilment of Study Load Outside the Study Programme and the Course Logbook (C). The Internship Supervisor monitors the outcomes of the student interns (C). The Assessor for Fulfilment of Study Load Outside the Study Programme conducts an overall |



| No | Semester | Course Code | Course Name | Credit | PLO assigned to the course | | | | | | | | | | | Form of Fulfilment of Study Load Outside the Designated Study Programme | Notes |
|----|----------|-------------|--|--------|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|---|---|
| | | | | | PLO 1 | PLO 2 | PLO 3 | PLO 4 | PLO 5 | PLO 6 | PLO 7 | PLO 8 | PLO 9 | PLO 10 | PLO 11 | | |
| | | | | | | | | | | | | | | | | | evaluation of student outcomes (C). |
| | 7/8 | 3325522668 | Multimedia Asset Design and Production | 2 | | √ | | | | | | √ | √ | √ | | | Independent Study (Multimedia Learning Materials Manager) Organised by the Ministry of Education, Culture, Research and Technology Conducted over one full semester Equivalent to 20 credits 1. Students must register with their department to take part in a certified work placement (P). 2. Students must register for the Course Registration Form (KRS) for Coursework Outside the Degree Programme in SIMEKAR, selecting the certified internship programme (P). 3. Students carry out the activities in accordance with the instructions of the certified internship committee (D). 4. Students complete the forms that appear in SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D). 5. The supervising lecturer monitors the SPADA for Fulfilment of Study Load Outside the Study Programme and the Course Logbook (C). 6. The Internship Supervisor monitors the outcomes of the student interns (C). 7. The Assessor for Fulfilment of Study Load Outside the Study Programme conducts an overall evaluation of student outcomes (C). |
| | 7/8 | 3325522670 | Integration Audio-Visual | 2 | | √ | | | | | | √ | √ | √ | | | Independent Study Organised by the Ministry of Education, Culture, |



| No | Semester | Course Code | Course Name | Credit | PLO assigned to the course | | | | | | | | | | | Form of Fulfilment of Study Load Outside the Designated Study Programme | Notes | |
|----|----------|-------------|---------------|--------|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|---|---|--|
| | | | | | PLO 1 | PLO 2 | PLO 3 | PLO 4 | PLO 5 | PLO 6 | PLO 7 | PLO 8 | PLO 9 | PLO 10 | PLO 11 | | | |
| | | | in Multimedia | | | | | | | | | | | | | | (Multimedia Learning Materials Manager) | <p>Research and Technology Conducted over one full semester Equivalent to 20 credits</p> <ol style="list-style-type: none"> 1. Students must register with their department to participate in the certified internship programme (P). 2. Students must register for the Course Registration Form (KRS) for Coursework Outside the Programme of Study in SIMEKAR, selecting the certified internship (P) activity. 3. Students carry out the activities in accordance with the instructions of the certified internship committee (D). 4. Students complete the forms generated in SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D). 5. The supervising lecturer monitors the SPADA for Fulfilment of Study Load Outside the Study Programme and the Course Logbook (C). 6. The Internship Supervisor monitors the outcomes of the student interns (C). 7. The Assessor for Fulfilment of Study Load Outside the Study Programme conducts an overall evaluation of student outcomes (C). |
| | 7/8 | 3325532663 | PCB Design | 3 | | √ | | | | √ | √ | | √ | | | | Independent Study (Electronics) | Organised by the Ministry of Education, Culture, Research and Technology |



| No | Semester | Course Code | Course Name | Credit | PLO assigned to the course | | | | | | | | | | | Form of Fulfilment of Study Load Outside the Designated Study Programme | Notes |
|----|----------|-------------|------------------------------|--------|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|---|--|
| | | | | | PLO 1 | PLO 2 | PLO 3 | PLO 4 | PLO 5 | PLO 6 | PLO 7 | PLO 8 | PLO 9 | PLO 10 | PLO 11 | | |
| | | | | | | | | | | | | | | | | Prototyping and Programming) | <p>Conducted over one full semester Equivalent to 20 credits</p> <ol style="list-style-type: none"> 1. Students must register with their department to participate in a certified internship (P). 2. Students must register for the Course Registration Form (KRS) for Coursework Outside the Programme via SIMEKAR, selecting the certified internship (P) activity. 3. Students carry out the activities in accordance with the instructions of the certified internship committee (D). 4. Students complete the forms generated in SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D). 5. The supervising lecturer monitors the SPADA for Fulfilment of Study Load Outside the Study Programme and the Course Logbook (C). 6. The Internship Supervisor monitors the outcomes of the student interns (C). 7. The Assessor for Fulfilment of Study Load Outside the Study Programme conducts an overall evaluation of student outcomes (C). |
| | 7/8 | 3325532665 | Embedded Systems Programming | 3 | | | √ | | | | √ | √ | | √ | | Independent Study (Electronics Prototyping and Programming) | <p>Organised by the Ministry of Education, Culture, Research and Technology</p> <p>Conducted over one full semester Equivalent to 20 credits</p> |



| No | Semester | Course Code | Course Name | Credit | PLO assigned to the course | | | | | | | | | | | Form of Fulfilment of Study Load Outside the Designated Study Programme | Notes | |
|----|----------|-------------|--------------------|--------|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|---|--|--|
| | | | | | PLO 1 | PLO 2 | PLO 3 | PLO 4 | PLO 5 | PLO 6 | PLO 7 | PLO 8 | PLO 9 | PLO 10 | PLO 11 | | | |
| | | | | | | | | | | | | | | | | | | <ol style="list-style-type: none"> Students must register with their department to participate in a certified internship (P). Students must register for the Course Registration Form (KRS) for Coursework Outside the Programme via SIMEKAR, selecting the certified internship (P) activity. Students carry out the activities in accordance with the instructions of the certified internship committee (D). Students complete the forms that appear in SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D). The supervising lecturer monitors the SPADA for Fulfilment of Study Load Outside the Study Programme and the Course Logbook (C). The Internship Supervisor monitors the outcomes of the student interns (C). The Assessor for Fulfilment of Study Load Outside the Study Programme conducts an overall evaluation of student outcomes (C). |
| | 7/8 | 3325522667 | System Interfacing | 2 | | | √ | | | | √ | √ | | √ | | | Independent Study (Electronics Prototyping and Programming) | Organised by the Ministry of Education, Culture, Research and Technology Conducted over one full semester Equivalent to 20 credits <ol style="list-style-type: none"> Students must register with their department to participate in a certified internship (P). |



| No | Semester | Course Code | Course Name | Credit | PLO assigned to the course | | | | | | | | | | | Form of Fulfilment of Study Load Outside the Designated Study Programme | Notes |
|----|----------|-------------|-------------|--------|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|---|---|
| | | | | | PLO 1 | PLO 2 | PLO 3 | PLO 4 | PLO 5 | PLO 6 | PLO 7 | PLO 8 | PLO 9 | PLO 10 | PLO 11 | | |
| | | | | | | | | | | | | | | | | | <p>2. Students must register for the Course Registration Form (KRS) for Coursework Outside the Programme via SIMEKAR, selecting the certified internship (P) activity.</p> <p>3. Students carry out the activities in accordance with the instructions of the certified internship committee (D).</p> <p>4. Students complete the forms that appear in SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D).</p> <p>5. The supervising lecturer monitors the SPADA for Fulfilment of Study Load Outside the Study Programme and the Course Logbook (C).</p> <p>6. The Internship Supervisor monitors the outcomes of the student interns (C).</p> <p>7. The Assessor for Fulfilment of Study Load Outside the Study Programme conducts an overall evaluation of student outcomes (C).</p> |
| | 7/8 | 3325522669 | Robotics | 2 | | √ | | | | √ | √ | | √ | | | | <p>Independent Study (Electronics Prototyping and Programming)</p> <p>Organised by the Ministry of Education, Culture, Research and Technology</p> <p>Conducted over one full semester</p> <p>Equivalent to 20 credits</p> <p>1. Students must register with their department to participate in a certified internship (P).</p> <p>2. Students must register for the Course Registration Form (KRS) for Coursework Outside</p> |



| No | Semester | Course Code | Course Name | Credit | PLO assigned to the course | | | | | | | | | | | Form of Fulfilment of Study Load Outside the Designated Study Programme | Notes |
|----|----------|-------------|-----------------------------|--------|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|---|---|
| | | | | | PLO 1 | PLO 2 | PLO 3 | PLO 4 | PLO 5 | PLO 6 | PLO 7 | PLO 8 | PLO 9 | PLO 10 | PLO 11 | | |
| | | | | | | | | | | | | | | | | | <p>the Programme via SIMEKAR, selecting the certified internship (P) activity.</p> <p>3. Students carry out the activities in accordance with the instructions of the certified internship committee (D).</p> <p>4. Students complete the forms that appear in SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D).</p> <p>5. The supervising lecturer monitors the SPADA for Fulfilment of Study Load Outside the Study Programme and the Course Logbook (C).</p> <p>6. The Internship Supervisor monitors the outcomes of the student interns (C).</p> <p>7. The Assessor for Fulfilment of Study Load Outside the Study Programme conducts an overall evaluation of student outcomes (C).</p> |
| | 7/8 | 3322144669 | Community Service Programme | 4 | √ | | | | | | √ | | | √ | | | <p>Thematic Community Service Programme</p> <p>Organised by the Community Service Centre of the Indonesian Teachers' Union University, Semarang</p> <p>Conducted over a period of approximately 3 months</p> <p>Conversion of 10 credits</p> <p>1. Students must register with their department to participate in the Thematic Community Service Programme of the UPGRIS (P).</p> <p>2. Students must register for the 'Course Load</p> |



| No | Semester | Course Code | Course Name | Credit | PLO assigned to the course | | | | | | | | | | | Form of Fulfilment of Study Load Outside the Designated Study Programme | Notes |
|----|----------|-------------|-----------------------|--------|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|---|--|
| | | | | | PLO 1 | PLO 2 | PLO 3 | PLO 4 | PLO 5 | PLO 6 | PLO 7 | PLO 8 | PLO 9 | PLO 10 | PLO 11 | | |
| | | | | | | | | | | | | | | | | | <p>Fulfilment Outside the Study Programme' module in SIMEKAR, selecting the Thematic Community Service Programme of the UPGRIS (P).</p> <p>3. Students carry out the activities in accordance with the instructions of the University of Teachers of the Republic of Indonesia, Semarang Thematic Community Service Programme committee (D).</p> <p>4. Students complete the forms that appear in SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D).</p> <p>5. The supervising lecturer monitors the SPADA for the Fulfilment of Study Load Outside the Study Programme and the Course Logbook (C).</p> <p>6. The supervising lecturer monitors student outcomes (C).</p> <p>7. The assessor for the fulfilment of study load outside the study programme conducts an overall evaluation of student outcomes (C).</p> |
| | 7/8 | BB24121604 | Community Development | 2 | √ | | | | | √ | | | √ | | | | <p>Thematic Community Service Programme</p> <p>Organised by the Community Service Centre of the Indonesian Teachers' Union University, Semarang</p> <p>Conducted over a period of approximately 3 months</p> <p>Conversion of 10 credits</p> <p>1. Students must register with their department to participate in the Thematic Community Service</p> |



| No | Semester | Course Code | Course Name | Credit | PLO assigned to the course | | | | | | | | | | | Form of Fulfilment of Study Load Outside the Designated Study Programme | Notes |
|----|----------|-------------|---------------------------|--------|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|---|---|
| | | | | | PLO 1 | PLO 2 | PLO 3 | PLO 4 | PLO 5 | PLO 6 | PLO 7 | PLO 8 | PLO 9 | PLO 10 | PLO 11 | | |
| | | | | | | | | | | | | | | | | | <p>Programme of the UPGRIS (P).</p> <p>2. Students must register for the 'Course Load Fulfilment Outside the Study Programme' module in SIMEKAR, selecting the Thematic Community Service Programme of the UPGRIS (P).</p> <p>3. Students carry out the activities in accordance with the instructions of the University of Teachers of the Republic of Indonesia, Semarang Thematic Community Service Programme committee (D).</p> <p>4. Students complete the forms that appear in SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D).</p> <p>5. The supervising lecturer monitors the SPADA for the Fulfilment of Study Load Outside the Study Programme and the Course Logbook (C).</p> <p>6. The supervising lecturer monitors student outcomes (C).</p> <p>7. The assessor for the fulfilment of study load outside the study programme conducts an overall evaluation of student outcomes (C).</p> |
| | 7/8 | BB24121645 | Entrepreneurship Concepts | 1 | √ | | | | | | √ | | | √ | | | <p>Thematic Community Service Programme</p> <p>Organised by the Community Service Centre of the Indonesian Teachers' Union University, Semarang</p> <p>Conducted over a period of approximately 3 months</p> <p>Conversion of 10 credits</p> |



| No | Semester | Course Code | Course Name | Credit | PLO assigned to the course | | | | | | | | | | | Form of Fulfilment of Study Load Outside the Designated Study Programme | Notes | |
|----|----------|-------------|--------------------|--------|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|---|--|---|
| | | | | | PLO 1 | PLO 2 | PLO 3 | PLO 4 | PLO 5 | PLO 6 | PLO 7 | PLO 8 | PLO 9 | PLO 10 | PLO 11 | | | |
| | | | | | | | | | | | | | | | | | | <ol style="list-style-type: none"> 1. Students must register with their department to participate in the Thematic Community Service Programme of the UPGRIS (P). 2. Students must register for the 'Course Load Fulfilment Outside the Study Programme' module in SIMEKAR, selecting the Thematic Community Service Programme of the UPGRIS (P). 3. Students carry out the activities in accordance with the instructions of the University of Teachers of the Republic of Indonesia, Semarang Thematic Community Service Programme committee (D). 4. Students complete the forms that appear in SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D). 5. The supervising lecturer monitors the SPADA for the Fulfilment of Study Load Outside the Study Programme and the Course Logbook (C). 6. The supervising lecturer monitors student outcomes (C). 7. The assessor for the fulfilment of study load outside the study programme conducts an overall evaluation of student outcomes (C). |
| | 7/8 | BB24121606 | Talent Development | 2 | √ | | | | | | √ | | | | √ | | Thematic Community Service Programme Organised by the Community Service Centre of the Indonesian Teachers' Union University, Semarang Conducted over a period of approximately 3 | |



| No | Semester | Course Code | Course Name | Credit | PLO assigned to the course | | | | | | | | | | | Form of Fulfilment of Study Load Outside the Designated Study Programme | Notes |
|-----|----------|-------------|--------------|--------|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|---|--|
| | | | | | PLO 1 | PLO 2 | PLO 3 | PLO 4 | PLO 5 | PLO 6 | PLO 7 | PLO 8 | PLO 9 | PLO 10 | PLO 11 | | |
| | | | | | | | | | | | | | | | | | <p>months</p> <p>Conversion of 10 credits</p> <ol style="list-style-type: none"> 1. Students must register with their department to participate in the Thematic Community Service Programme of the UPGRIS (P). 2. Students must register for the Course Registration Form (KRS) for Study Load Fulfilment Outside the Degree Programme in SIMEKAR, specifying the Thematic Community Service Programme (KKN) of the UPGRIS (P). 3. Students carry out activities in accordance with the instructions of the Thematic Community Service Programme committee of the UPGRIS (D). 4. Students complete the forms that appear in SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D). 5. The supervising lecturer monitors the SPADA for the Fulfilment of Study Load Outside the Study Programme and the Course Logbook (C). 6. The supervising lecturer monitors student outcomes (C). 7. The assessor for the fulfilment of study load outside the study programme conducts an overall evaluation of student outcomes (C). |
| 7/8 | | BB24121648 | Field Survey | 1 | √ | | | | | √ | | | √ | | | Thematic | Organised by the Community Service Centre of |



| No | Semester | Course Code | Course Name | Credit | PLO assigned to the course | | | | | | | | | | | Form of Fulfilment of Study Load Outside the Designated Study Programme | Notes |
|----|----------|-------------|-------------|--------|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|---|---|
| | | | | | PLO 1 | PLO 2 | PLO 3 | PLO 4 | PLO 5 | PLO 6 | PLO 7 | PLO 8 | PLO 9 | PLO 10 | PLO 11 | | |
| | | | | | | | | | | | | | | | | Community Service Programme | <p>the Indonesian Teachers' Union University, Semarang</p> <p>Conducted over a period of approximately 3 months</p> <p>Conversion of 10 credits</p> <ol style="list-style-type: none"> 1. Students must register with their department to participate in the Thematic Community Service Programme of the UPGRIS (P). 2. Students must register for the 'Course Load Fulfilment Outside the Study Programme' module in SIMEKAR, selecting the Thematic Community Service Programme of the UPGRIS (P). 3. Students carry out the activities in accordance with the instructions of the University of Teachers of the Republic of Indonesia, Semarang Thematic Community Service Programme committee (D). 4. Students complete the forms that appear in SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D). 5. The supervising lecturer monitors the SPADA for the Fulfilment of Study Load Outside the Study Programme and the Course Logbook (C). 6. The supervising lecturer monitors student outcomes (C). 7. The Assessor for Fulfilment of Study Load Outside the Study Programme conducts an overall |



| No | Semester | Course Code | Course Name | Credit | PLO assigned to the course | | | | | | | | | | | Form of Fulfilment of Study Load Outside the Designated Study Programme | Notes |
|----|----------|-------------|-------------|--------|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|---|-------------------------------------|
| | | | | | PLO 1 | PLO 2 | PLO 3 | PLO 4 | PLO 5 | PLO 6 | PLO 7 | PLO 8 | PLO 9 | PLO 10 | PLO 11 | | |
| | | | | | | | | | | | | | | | | | evaluation of student outcomes (C). |
| | | | Total SKS | 88 | | | | | | | | | | | | | |

11.7 Quality assurance for activities outside the degree programme

To ensure that the implementation of the policy on the Fulfilment of Study Load Outside the Study Programme, specifically the “right to study for three semesters outside the study programme”, proceeds with guaranteed quality, the following quality standards must be established, including:

1. Quality of participants’ competencies.
2. Quality of implementation.
3. Quality of internal and external supervision processes.
4. Quality of facilities and infrastructure for implementation.
5. Quality of reporting and presentation of results.
6. Quality of assessment

Table 10.7 Quality Assurance of Learning Delivery Outside the Study Programme



| No | Forms of Fulfilment of Study Load Outside the Study Programme | Requirements | Notes |
|-----|---|---|---|
| (1) | (2) | (3) | (4) |
| 1. | Teaching Placement | Students must pass the following modules: 1. Microteaching (grade B), 2. Have completed a minimum of 100 credits. | <ol style="list-style-type: none"> 1. Students must register with the programme to participate in the teaching placement (P). 2. Students must register for the Course Registration Form (KRS) for Coursework Outside the Programme of Study in SIMEKAR, selecting the Educational Internship (P) activity. 3. Students carry out the activities in accordance with the instructions of the Educational Internship committee (D). 4. Students complete the forms that appear in SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D). 5. The supervising lecturer monitors the SPADA for the Fulfilment of Study Load Outside the Study Programme and the Course Logbook (C). 6. The Internship Supervisor monitors the outcomes of the student interns (C). 7. The Assessor for Fulfilment of Study Load Outside the Study Programme conducts an overall evaluation of student outcomes (C). |
| 2. | Work/Industry Placement CoE PMPM | Conducted in semester 7. Minimum grade of B in the following courses: 1. Physics teaching materials and resources. | <ol style="list-style-type: none"> Conducted over 3 months Converted to 10 credits. 1. Students must register with the programme to participate in the CoE PMPM work placement/industrial placement (P). 2. Students must register for the Course Registration Form (KRS) for Study Load Fulfilment Outside the Study Programme in SIMEKAR, selecting the CoE PMPM (P) work placement/industrial placement activity. 3. Students carry out the activities in accordance with the instructions of the CoE PMPM work placement/industrial placement committee (D). 4. Students complete the forms that appear in SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D). 5. The supervising lecturer monitors the SPADA for the Fulfilment of Study Load Outside the Study Programme and the Course Logbook (C). 6. The Internship Supervisor monitors the outcomes of the student interns (C). |



| No | Forms of Fulfilment of Study Load Outside the Study Programme | Requirements | Notes |
|----|--|---|---|
| | | | 7. The assessor for the fulfilment of study load outside the study programme conducts an overall evaluation of student outcomes (C). |
| 3 | Work/Industry Placement at the CoE Electronics Prototyping and Programming | Conducted in semester 7. Minimum grade of B in the following courses: <ol style="list-style-type: none"> 1. Basic Electronics, 2. Basic Electronics Practical, 3. Digital Electronics, 4. Basic Electronics Laboratory, 5. Computer Programming. | Conducted over 3 months Converted to 10 credits <ol style="list-style-type: none"> 1. Students must register with the programme to participate in the CoE electronics prototyping and programming (P) work placement/industrial placement. 2. Students must register for the Course Registration Form (KRS) for Study Load Fulfilment Outside the Degree Programme in SIMEKAR, specifying the CoE PMPM (P) work placement/industrial placement. 3. Students carry out activities in accordance with the instructions of the CoE PMPM work placement/industrial placement committee (D). 4. Students complete the forms that appear in SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D). 5. The supervising lecturer monitors the SPADA for the Fulfilment of Study Load Outside the Study Programme and the Course Logbook (C). 6. The Internship Supervisor monitors the outcomes of the student interns (C). 7. The assessor for the fulfilment of study load outside the study programme conducts an overall evaluation of student outcomes (C). |
| 4 | Teaching Assistance) | This activity is intended for final-year students (from semester 7 onwards). | Conducted over 1 semester Converted to 20 credits <ol style="list-style-type: none"> 1. Students must register with their department to participate in the Academic Future Teacher (AFT) (P) programme. 2. Students must register for the 'Course Load Fulfilment Outside the Study Programme' module in SIMEKAR, selecting the Academic Future Teacher (AFT) (P) activity. 3. Students carry out the activities in accordance with the instructions of the Academic Future Teacher (AFT) committee (D). 4. Students complete the forms that appear in SIMEKAR: course logbook, daily activity log, |



| No | Forms of Fulfilment of Study Load Outside the Study Programme | Requirements | Notes |
|----|---|--|---|
| | | | critical analysis, etc. (D). 5. The supervising lecturer monitors the SPADA for the Fulfilment of Study Load Outside the Study Programme and the Course Logbook (C). 6. The academic supervisor monitors student outcomes (C). 7. The assessor for the fulfilment of study load outside the study programme conducts an overall evaluation of student outcomes (C). |
| 5 | SEA TEACHER | Students may participate in this activity from Semester 7 onwards. | Organised by SEAMEO under the coordination of UPT KUI Lasting approximately 1 month Converted to 10 credits 1. Students must register with their department to participate in the SEA TEACHER (P) programme. 2. Students must register for the 'Course Load Fulfilment Outside the Study Programme' module in SIMEKAR, selecting the SEA TEACHER (P) activity. 3. Students carry out the activities in accordance with the instructions of the SEA TEACHER (D) committee. 4. Students complete the forms that appear in SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D). 5. The supervising lecturer monitors the SPADA for Fulfilment of Study Load Outside the Study Programme and the Course Logbook (C). 6. The academic supervisor monitors student outcomes (C). 7. The assessor for the fulfilment of study load outside the study programme conducts an overall evaluation of student outcomes (C). |
| 6 | International Community Service Placement | Students may participate in this activity from Semester 5 onwards. | Organised by the UPT KUI of the UPGRIS Lasting approximately 1 month Converted to 10 credits 1. Students must register with their department to participate in the International PPL KKN (P) programme. |



| No | Forms of Fulfilment of Study Load Outside the Study Programme | Requirements | Notes |
|----|---|--|--|
| | | | 2. Students must register for the 'Course Load Fulfilment Outside the Study Programme' module in SIMEKAR, selecting the International PPL KKN (P) activity. 3. Students carry out the activities in accordance with the instructions of the International PPL KKN committee (D). 4. Students complete the forms that appear in SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D). 5. The supervising lecturer monitors the SPADA for the Fulfilment of Study Load Outside the Study Programme and the Course Logbook (C). 6. The supervising lecturer monitors student outcomes (C). 7. The assessor for the fulfilment of study load outside the study programme conducts an overall evaluation of student outcomes (C). |
| 7 | Merdeka Student Exchange (PMM) | Requirements in accordance with the updated programme from the Ministry of Education, Culture, Research and Technology courses must have the same CLO as the study programme students must be in at least their 6th semester. | Kemdikbudristek Programme Conducted over a full semester The host institution must be a university located on a different island The number of credits converted corresponds to the courses taken by the student at the host university 1. Students must register with their programme to participate in the PMM (P) activity. 2. Students must register for the Course Registration Form (KRS) for Course Load Fulfilment Outside the Programme of Study in SIMEKAR, selecting the PMM (P) activity. 3. Students carry out the activities in accordance with the PMM committee's instructions (D). 4. Students complete the forms that appear in SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D). 5. The supervising lecturer monitors the SPADA for Fulfilment of Study Load Outside the Study Programme and the Course Logbook (C). 6. The academic supervisor monitors student outcomes (C). 7. The Assessor for Fulfilment of Study Load Outside the Study Programme conducts an |



| No | Forms of Fulfilment of Study Load Outside the Study Programme | Requirements | Notes |
|----|---|---|---|
| | | | overall evaluation of student outcomes (C). |
| 8 | PURWAKA | Student exchange activities organised independently by the Study Programme, Faculty, or University. | <p>These activities must be recorded in the http://bursakmm.lldikti6.id</p> <p>Conducted over a full semester</p> <p>Converted according to the courses taken by the student</p> <ol style="list-style-type: none"> 1. Students must register with their programme to participate in the PURWAKA (P) activity. 2. Students must register for the Course Registration Form (KRS) for Course Load Fulfilment Outside the Study Programme in SIMEKAR, selecting the PURWAKA (P) activity. 3. Students carry out the activity in accordance with the instructions of the PURWAKA committee (D). 4. Students complete the forms that appear in SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D). 5. The supervising lecturer monitors the SPADA for the Fulfilment of Study Load Outside the Study Programme and the Course Logbook (C). 6. The academic supervisor monitors student outcomes (C). 7. The assessor for the fulfilment of study load outside the study programme conducts an overall evaluation of student outcomes (C). |
| 9 | Student exchange between study programmes within the UPGRIS | Offered to fifth-semester students. | <p>Courses taken in other programmes within the UPGRIS</p> <ol style="list-style-type: none"> 1. Students must register with their department to participate in the inter-departmental student exchange programme within the University of Teachers of the Republic of Indonesia, Semarang (P). 2. Students must complete the Course Registration Form (KRS) for Study Load Fulfilment Outside the Programme of Study in SIMEKAR, specifying the Inter-Departmental Student Exchange Programme within the University of Teachers of the Republic of Indonesia, Semarang (P). 3. Students carry out activities in accordance with the instructions of the Inter-Departmental Student Exchange Committee within the University of Teachers of the Republic of |



| No | Forms of Fulfilment of Study Load Outside the Study Programme | Requirements | Notes |
|----|---|---|---|
| | | | Indonesia, Semarang (D). 4. Students complete the forms that appear in SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D). 5. The supervising lecturer monitors the SPADA fulfilment of study load requirements outside the study programme and the course logbook (C). 6. The academic supervisor monitors student outcomes (C). 7. The assessor for the fulfilment of study load outside the study programme conducts an overall evaluation of student outcomes (C). |
| 10 | Credit Transfer | Conducted from at least the 6th semester. | Organised by the UPT KUI Conducted over 1 semester. Credit conversion follows the courses taken by the student At the host institution 1. Students must register with their programme to participate in the Credit Transfer (P) scheme. 2. Students must complete the Course Registration Form (KRS) for Course Load Fulfilment Outside the Programme of Study in SIMEKAR, selecting the Credit Transfer (P) option. 3. Students carry out the activities in accordance with the instructions of the Credit Transfer committee (D). 4. Students complete the forms that appear in SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D). 5. The supervising lecturer monitors the SPADA for Course Load Fulfilment Outside the Study Programme and the Course Logbook (C). 6. The Academic Advisor monitors student outcomes (C). 7. The Assessor for Fulfilment of Study Load Outside the Study Programme conducts an overall evaluation of student outcomes (C). |
| 11 | Certified Internship | The activity is undertaken by students from Semester 5 onwards. | Organised by the Ministry of Education, Culture, Research and Technology Conducted over a full semester |



| No | Forms of Fulfilment of Study Load Outside the Study Programme | Requirements | Notes |
|----|---|--|--|
| | | | Conversion of 20 credits 1. Students must register with their department to participate in the certified internship programme (P). 2. Students must register for the Course Registration Form (KRS) for Coursework Outside the Degree Programme in SIMEKAR, selecting the certified internship programme (P). 3. Students carry out the activities in accordance with the instructions of the certified internship committee (D). 4. Students complete the forms that appear in SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D). 5. The supervising lecturer monitors the SPADA for Fulfilment of Study Load Outside the Study Programme and the Course Logbook (C). 6. The Internship Supervisor monitors the outcomes of the student interns (C). 7. The Assessor for Fulfilment of Study Load Outside the Study Programme conducts an overall evaluation of student outcomes (C). |
| 12 | Fulfilment of Study Load Outside the BRIN Programme | This activity is only open to students in at least their 6th semester. | Conducted over a full semester Conversion to 20 ECTS credits 1. Students must register with their department to participate in the BRIN (P) Programme for Fulfilling Academic Load Outside the Degree Programme. 2. Students must register for the Course Registration Form (KRS) for the Fulfilment of Study Load Outside the BRIN Study Programme in SIMEKAR, selecting the 'Fulfilment of Study Load Outside the BRIN Study Programme (P)' activity. 3. Students carry out the activity in accordance with the instructions of the BRIN (D) Programme-External Course Load Fulfilment committee. 4. Students complete the forms that appear in SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D). 5. The supervising lecturer monitors the SPADA for the Fulfilment of Study Load Outside the Study Programme and the Course Logbook (C). |



| No | Forms of Fulfilment of Study Load Outside the Study Programme | Requirements | Notes |
|----|---|--|---|
| | | | <p>6. The Academic Supervisor monitors student outcomes (C).</p> <p>7. The assessor for the Fulfilment of Learning Load Outside the Study Programme conducts an overall evaluation of student outcomes (C).</p> |
| 13 | MAHARDEKA | The activity is attended by students from Semester 6 onwards. | <p>Organised by LLDIKTI VI</p> <p>Conducted over a full semester</p> <p>Equivalent to 20 credits.</p> <ol style="list-style-type: none"> 1. Students must register with their department to participate in the MAHARDEKA (P) programme. 2. Students must register for the Course Registration Form (KRS) for Coursework Outside the Programme of Study in SIMEKAR, selecting the MAHARDEKA (P) activity. 3. Students carry out the activities in accordance with the instructions of the MAHARDEKA committee (D). 4. Students complete the forms that appear in SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D). 5. The supervising lecturer monitors the SPADA for Fulfilment of Study Load Outside the Study Programme and the Course Logbook (C). 6. The academic supervisor monitors student outcomes (C). 7. The assessor for the fulfilment of study load outside the study programme conducts an overall evaluation of student outcomes (C). |
| 14 | Independent Entrepreneurship | Students may participate in this activity from the third semester onwards. | <p>Conducted over 1 semester</p> <p>Conversion: 20 credits</p> <ol style="list-style-type: none"> 1. Students must register with their department to participate in the Independent Entrepreneurship (P) programme. 2. Students must select the 'Fulfilment of Study Load Outside the Degree Programme' course in SIMEKAR, specifying the Independent Entrepreneurship (P) activity. 3. Students carry out the activities in accordance with the instructions of the Wirausaha Merdeka committee (D). |



| No | Forms of Fulfilment of Study Load Outside the Study Programme | Requirements | Notes |
|----|---|---|---|
| | | | 4. Students complete the forms that appear in SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D). 5. The supervising lecturer monitors the SPADA for Fulfilment of Study Load Outside the Study Programme and the Course Logbook (C). 6. The supervising lecturer monitors student outcomes (C). 7. The Assessor for Fulfilment of Study Load Outside the Study Programme conducts an overall evaluation of student outcomes (C). |
| 15 | P2MW (Student Entrepreneurship Development Programme) | Conducted in the 6th semester; if undertaken before the 6th semester, it will be converted to a free-form module in accordance with the BELMAWA information schedule. | Conversion is granted upon passing 7 credits; if the student reaches the EXPO, 3 credits will be added 1. Students must register with their department to participate in the P2MW (P) programme. 2. Students must register for the Course Registration Form (KRS) for Course Load Fulfilment Outside the Study Programme in SIMEKAR, selecting the P2MW (P) activity. 3. Students carry out the activities in accordance with the instructions of the P2MW committee (D). 4. Students complete the forms that appear in SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D). 5. The supervising lecturer monitors the SPADA for Fulfilment of Study Load Outside the Study Programme and the Course Logbook (C). 6. The academic supervisor monitors student outcomes (C). 7. The assessor for the fulfilment of study load outside the study programme conducts an overall evaluation of student outcomes (C). |
| 16 | INDEPENDENT | Students may participate from the 6th semester onwards. | Organised by LLDIKTI VI Conducted over 1 semester Converted to 20 credits 1. Students must register with their department to participate in the BERDIKARI (P) programme. 2. Students must register for the Course Registration Form (KRS) for Coursework Outside |



| No | Forms of Fulfilment of Study Load Outside the Study Programme | Requirements | Notes |
|----|---|---|--|
| | | | <p>the Degree Programme in SIMEKAR, selecting the BERDIKARI (P) activity.</p> <p>3. Students carry out the activities in accordance with the instructions of the BERDIKARI committee (D).</p> <p>4. Students complete the forms that appear in SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D).</p> <p>5. The supervising lecturer monitors the SPADA for Fulfilment of Study Load Outside the Study Programme and the Course Logbook (C).</p> <p>6. The academic supervisor monitors student outcomes (C).</p> <p>7. The assessor for the fulfilment of study load outside the study programme conducts an overall evaluation of student outcomes (C).</p> |
| 17 | Certified Independent Study Placement (MSIB) | The activity is open to students from Semester 6 onwards. | <p>Conducted over a full semester</p> <p>Conversion: 20 credits</p> <p>1. Students must register with their department to participate in the Certified Independent Study (MSIB) (P) programme.</p> <p>2. Students must register for the Course Registration Form (KRS) for Coursework Outside the Degree Programme in SIMEKAR, selecting the Certified Independent Study (MSIB) (P) activity.</p> <p>3. Students carry out the activities in accordance with the instructions of the Certified Independent Study (MSIB) committee (D).</p> <p>4. Students complete the forms that appear in SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D).</p> <p>5. The supervising lecturer monitors the SPADA for the Fulfilment of Study Load Outside the Study Programme and the Course Logbook (C).</p> <p>6. The supervising lecturer monitors student outcomes (C).</p> <p>7. The Assessor for Fulfilment of Study Load Outside the Study Programme conducts an overall evaluation of student outcomes (C).</p> |
| 18 | KABARI | Students may participate in the activity from | Conducted over a full semester |



| No | Forms of Fulfilment of Study Load Outside the Study Programme | Requirements | Notes |
|----|---|---|--|
| | | Semester 6 onwards. | Converted to 20 credits 1. Students must register with their department to participate in the KABARI (P) programme. 2. Students must register for the 'Course Load Fulfilment Outside the Study Programme' module in SIMEKAR, selecting the KABARI (P) activity. 3. Students carry out the activity in accordance with the instructions of the KABARI committee (D). 4. Students complete the forms that appear in SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D). 5. The supervising lecturer monitors the SPADA for Fulfilment of Study Load Outside the Study Programme and the Course Logbook (C). 6. The academic supervisor monitors student outcomes (C). 7. The assessor for the fulfilment of study load outside the study programme conducts an overall evaluation of student outcomes (C). |
| 19 | Thematic Community Service Programme of UPGRIS | The activity is open to students from Semester 6 onwards. | Organised by the Community Service Centre of the UPGRIS Conducted over approximately 3 months Conversion: 10 credits 1. Students must register with their department to participate in the Thematic Community Service Programme of the UPGRIS (P). 2. Students must register for the 'Course Load Fulfilment Outside the Study Programme' module in SIMEKAR, selecting the Thematic Community Service Programme of the UPGRIS (P). 3. Students carry out the activities in accordance with the instructions of the University of Teachers of the Republic of Indonesia, Semarang Thematic Community Service Programme committee (D). 4. Students complete the forms that appear in SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D). |



| No | Forms of Fulfilment of Study Load Outside the Study Programme | Requirements | Notes |
|----|---|---|---|
| | | | 5. The supervising lecturer monitors the SPADA for the Fulfilment of Study Load Outside the Study Programme and the Course Logbook (C). 6. The supervising lecturer monitors student outcomes (C). 7. The assessor for the fulfilment of study load outside the study programme conducts an overall evaluation of student outcomes (C). |
| 20 | MANGUNSARI | Students may participate in the activity from Semester 6 onwards. | Organised by LLDIKTI VI Conducted over a full semester Conversion: 20 credits 1. Students must register with their department to participate in the MANGUNSARI (P) programme. 2. Students must register for the Course Registration Form (KRS) for Study Load Fulfilment Outside the Study Programme in SIMEKAR, selecting the MANGUNSARI (P) activity. 3. Students carry out the activities in accordance with the instructions of the MANGUNSARI committee (D). 4. Students complete the forms that appear in SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D). 5. The supervising lecturer monitors the SPADA for the Fulfilment of Study Load Outside the Study Programme and the Course Logbook (C). 6. The academic supervisor monitors student outcomes (C). 7. The assessor for the fulfilment of study load outside the study programme conducts an overall evaluation of student outcomes (C). |
| 21 | MAHESA | The programme is open to students from the 6th semester onwards. | Programme under the Vice-Chancellor 3 Runs for 3 weeks Equivalent to 7 ECTS credits 1. Students must register with their department to participate in the MAHESA (P) programme. 2. Students must register for the 'Course Load Fulfilment Outside the Programme' module |



| No | Forms of Fulfilment of Study Load Outside the Study Programme | Requirements | Notes |
|----|---|---|--|
| | | | <p>in SIMEKAR, selecting the MAHESA (P) activity.</p> <p>3. Students carry out the activities in accordance with the instructions of the MAHESA committee (D).</p> <p>4. Students complete the forms that appear in SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D).</p> <p>5. The supervising lecturer monitors the SPADA for Fulfilment of Study Load Outside the Study Programme and the Course Logbook (C).</p> <p>6. The academic supervisor monitors student outcomes (C).</p> <p>7. The Assessor for Fulfilment of Study Load Outside the Study Programme conducts an overall evaluation of student outcomes (C).</p> |
| 22 | International Community Service | The activity is open to students from Semester 6 onwards. | <p>Organised by the UPT KUI</p> <p>The programme runs for a full week at the location</p> <p>Conversion: 4 credits</p> <p>1. Students must register with their department to participate in the International Community Service Programme (P).</p> <p>2. Students must register for the 'Course Load Fulfilment Outside the Study Programme' module in SIMEKAR, selecting the International Community Service Programme (P).</p> <p>3. Students carry out the activities in accordance with the instructions of the International Community Service Programme committee (D).</p> <p>4. Students complete the forms that appear in SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D).</p> <p>5. The supervising lecturer monitors the SPADA for Fulfilment of Study Load Outside the Study Programme and the Course Logbook (C).</p> <p>6. The supervising lecturer monitors student outcomes (C).</p> <p>7. The Assessor for Fulfilment of Study Load Outside the Study Programme conducts an overall evaluation of student outcomes (C).</p> |
| 23 | Lecturer Community | To be undertaken by active students in their 7th | Community service funded by DTRM and LPPM |



| No | Forms of Fulfilment of Study Load Outside the Study Programme | Requirements | Notes |
|----|---|---|--|
| | Service | semester; those below the 7th semester may use a free-form approach. | Conversion of 6 credits 1. Students must register with their department to participate in the lecturer's community service activity (P). 2. Students must register for the Course Registration Form (KRS) for Academic Load Fulfilment Outside the Study Programme in SIMEKAR, selecting the faculty service activity (P). 3. Students carry out the activities in accordance with the instructions of the faculty community service committee (D). 4. Students complete the forms generated in SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D). 5. The supervising lecturer monitors the SPADA for Fulfilment of Study Load Outside the Study Programme and the Course Logbook (C). 6. The supervising lecturer monitors student outcomes (C). 7. The assessor for the fulfilment of study load outside the study programme conducts an overall evaluation of student outcomes (C). |
| 24 | Student Organisation Activities | Students may participate in activities from Semester 7 onwards; those in earlier semesters are granted free form. | If students are awarded funding, they receive a conversion of 7 credits If they pass the ABDIDAYA ORMAWA assessment, they receive an additional 3 credits 1. Students must register with their department to participate in the PPK Ormawa (P) activity. 2. Students must register for the Course Registration Form (KRS) for Academic Load Fulfilment Outside the Study Programme in SIMEKAR, selecting the PPK Ormawa (P) activity. 3. Students carry out the activities in accordance with the instructions of the PPK Ormawa committee (D). 4. Students complete the forms that appear in SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D). |



| No | Forms of Fulfilment of Study Load Outside the Study Programme | Requirements | Notes |
|----|---|--|---|
| | | | 5. The supervising lecturer monitors the SPADA for Fulfilment of Study Load Outside the Study Programme and the Course Logbook (C). 6. The academic supervisor monitors student outcomes (C). 7. The assessor for the fulfilment of study load outside the study programme conducts an overall evaluation of student outcomes (C). |
| 25 | HUMANITARIAN PROJECT BKP | Students may participate in the activity from Semester 6 onwards. | Duration: one full semester Conversion: 20 credits 1. Students must register with their department to participate in the BKP HUMANITARIAN PROJECT (P) activity. 2. Students must complete the Course Registration Form for External Academic Load in SIMEKAR, selecting the BKP HUMANITARIAN PROJECT (D) activity. 4. Students complete the forms that appear in SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D). 5. The supervising lecturer monitors the SPADA for Fulfilment of Study Load Outside the Study Programme and the Course Logbook (C). 6. The academic supervisor monitors the student's learning outcomes (C). 7. The Assessor for Fulfilment of Study Load Outside the Study Programme conducts an overall evaluation of student outcomes (C). |
| 26 | KENARI | The activity is attended by final-year students (from semester 7 onwards). | The research is conducted over a full semester Conversion of 20 credits. 1. Students must register with their department to participate in the KENARI (P) programme. 2. Students must register for the 'Course Load Fulfilment Outside the Study Programme' module in SIMEKAR, selecting the KENARI (P) activity. 3. Students carry out the activity in accordance with the instructions of the KENARI committee (D). 4. Students complete the forms that appear in SIMEKAR: course logbook, daily activity log, |



| No | Forms of Fulfilment of Study Load Outside the Study Programme | Requirements | Notes |
|----|---|--|---|
| | | | critical analysis, etc. (D). 5. The supervising lecturer monitors the SPADA for Fulfilment of Study Load Outside the Study Programme and the Course Logbook (C). 6. The academic supervisor monitors student outcomes (C). 7. The Assessor for Fulfilment of Study Load Outside the Study Programme conducts an overall evaluation of student outcomes (C). |
| 27 | Lecturer Research | Open to active students in their 7th semester; those below the 7th semester receive a free form. | Students become members of the lecturer's research Conversion of 6 credits 1. Students must register with their department to participate in the Lecturer Research (P) activity. 2. Students must register for the Course Registration Form (KRS) for Course Load Fulfilment Outside the Study Programme in SIMEKAR, selecting the Lecturer Research (P) activity. 3. Students carry out the activities in accordance with the instructions of the Faculty Research Committee (D). 4. Students complete the forms that appear in SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D). 5. The supervising lecturer monitors the SPADA for Fulfilment of Study Load Outside the Study Programme and the Course Logbook (C). 6. The Internship Supervisor monitors student outcomes (C). 7. The Assessor for Fulfilment of Study Load Outside the Study Programme conducts an overall evaluation of student outcomes (C). |
| 28 | Research-based Student Creativity Programmes (PKM RSH and PKM RE) | Student activities in semester 7 are converted into course credits; however, if the activity takes place before semester 7, it is treated as a free-form activity. | If a student secures funding, they receive 7 credits If they qualify for PIMNAS, they receive an additional 3 credits 1. Students must register with their department to participate in the PKM Research (PKM RSH and PKM RE) programme (P). 2. Students must register for the Course Registration Form (KRS) for Academic Load |



| No | Forms of Fulfilment of Study Load Outside the Study Programme | Requirements | Notes |
|----|---|--------------|---|
| | | | <p>Fulfilment Outside the Study Programme in SIMEKAR, selecting the PKM Research (PKM RSH and PKM RE) (P) activity.</p> <p>3. Students carry out the activities in accordance with the instructions of the PKM Research (PKM RSH and PKM RE) committee (D).</p> <p>4. Students complete the forms that appear in SIMEKAR: course logbook, daily activity log, critical analysis, etc. (D).</p> <p>5. The supervising lecturer monitors the SPADA for Fulfilment of Study Load Outside the Study Programme and the Course Logbook (C).</p> <p>6. The PKM Supervisor monitors the PKM students' outputs (C).</p> <p>7. The Assessor for Fulfilment of Study Load Outside the Study Programme conducts an overall evaluation of student outputs (C).</p> |



12. Quality Assurance

12.1 Quality Control Courses

The quality of both the learning process and its outcomes must be ensured through control over various aspects of implementation, including specific stages or steps within the learning process. Consequently, minimum activity outcomes are established for the delivery of lectures through courses within the group known as Quality Control Courses for each Study Programme. The minimum results that students must achieve for their participation in the aforementioned courses must be equal to or higher than a B grade. Study Programmes may list Quality Control Courses in Table 12.1

Table 12.1. Quality Control Courses

Quality Control Courses for All Students in the Physics Education Study Programme:

| No | Course Code | Course | Credit |
|----------------------|-------------|---|-----------|
| 1 | 3325341622 | Basic Physics: Thermal Mechanics | 4 |
| 2 | 3325341623 | Basic Physics: Electromagnetism | 4 |
| 3 | 3325321624 | Thermodynamics | 2 |
| 4 | 3325321625 | Basic Electronics | 2 |
| 5 | 3325322627 | Computer Programming | 2 |
| 6 | 3325321628 | Classical Mechanics | 3 |
| 7 | 3325331629 | Physics Learning and Instructions | 3 |
| 8 | 3325331632 | Electricity and Magnetism | 3 |
| 9 | 3325321635 | 10th Grade Senior High School Physics | 3 |
| 10 | 3325321638 | Modern Physics | 3 |
| 11 | 3325331640 | Waves and Optics | 3 |
| 12 | 3325321642 | 11th Grade Senior High School Physics | 2 |
| 13 | 3325341646 | Physics Learning Media and Materials | 4 |
| 14 | 3325331647 | Physics Learning Strategies | 3 |
| 15 | 3325332655 | Evaluation of Learning Processes and Outcomes | 3 |
| 16 | 3325322658 | Microteaching | 2 |
| 17 | 3325324659 | Internship – Curriculum Analysis | 2 |
| 18 | 3325324660 | Internship – Lesson Plan Development | 2 |
| 19 | 3325324661 | Internship – Learning Media Development | 2 |
| 20 | 3325344662 | Internship – Teaching Practice | 4 |
| 21 | 3325665671 | Final Project | 6 |
| Total credits | | | 62 |

Quality Control Course for the Field of Study/Competency/Pedagogical Knowledge Cluster

| No | Course Code | Course | Credit |
|----|-------------|---|--------|
| 1 | 3325331629 | Physics Learning and Instructions | 3 |
| 2 | 3325321635 | 10th Grade Senior High School Physics | 3 |
| 3 | 3325321642 | 11th Grade Senior High School Physics | 2 |
| 4 | 3325341646 | Physics Learning Media and Materials | 4 |
| 5 | 3325331647 | Physics Learning Strategies | 3 |
| 6 | 3325332655 | Evaluation of Learning Processes and Outcomes | 3 |
| 7 | 3325322658 | Microteaching | 2 |



| No | Course Code | Course | Credit |
|----------------------|-------------|---|-----------|
| 8 | 3325324659 | Internship – Curriculum Analysis | 2 |
| 9 | 3325324660 | Internship – Lesson Plan Development | 2 |
| 10 | 3325324661 | Internship – Learning Media Development | 2 |
| 11 | 3325344662 | Internship – Teaching Practice | 4 |
| Total credits | | | 30 |

Quality Control Course for the Field of Study/Competency/Knowledge Cluster in Physics

| No | Course Code | Course | Credit |
|----------------------|-------------|----------------------------------|-----------|
| 1 | 3325341622 | Basic Physics: Thermal Mechanics | 4 |
| 2 | 3325341623 | Basic Physics: Electromagnetism | 4 |
| 3 | 3325321624 | Thermodynamics | 2 |
| 4 | 3325321628 | Classical Mechanics | 3 |
| 5 | 3325331632 | Electricity and Magnetism | 3 |
| 6 | 3325321638 | Modern Physics | 3 |
| 7 | 3325331640 | Waves and Optics | 3 |
| Total credits | | | 22 |

Quality Control Course for the Field of Study/Competency/Cluster of Mathematics and Computing

| No | Course Code | Course | Credit |
|----------------------|-------------|----------------------|----------|
| 1 | 3325322627 | Computer Programming | 2 |
| Total credits | | | 2 |

Quality Control Course for the Electronics Field of Study/Competency/Cluster and its Applications

| No | Course Code | Course | Credit |
|----------------------|-------------|-------------------|----------|
| 1 | 3325321625 | Basic Electronics | 2 |
| Total credits | | | 2 |

Quality Control Course for Research and Publication Fields/Competencies/Clusters

| No | Course Code | Course | Credit |
|----------------------|-------------|---------------|----------|
| 1 | 3325665671 | Final Project | 6 |
| Total credits | | | 6 |

12.2 Course Prerequisites

The programme must map courses based on their interrelationships so that students can more easily plan their studies. By viewing this course structure, students are encouraged to take each course seriously as they are linked to subsequent courses. The programme may enter Prerequisite Courses in Table 12.2.

Table 12.2. Prerequisite Courses

| No | Code | Course Name | Prerequisite for | | | |
|----|------------|----------------------------------|------------------|----------|------------|----------------|
| | | | Prerequisi sites | Semester | Code | Course Title |
| 1 | 3325341622 | Basic Physics: Thermal Mechanics | L | II | 3325321624 | Thermodynamics |



| No | Code | Course Name | Prerequisite for | | | |
|----|------------|---|------------------|----------|------------|---|
| | | | Prerequi sites | Semester | Code | Course Title |
| | | | PT | III | 3325321628 | Classical Mechanics |
| | | | L | III | 3325321635 | 10th Grade Senior High School Physics |
| | | | L | IV | 3325331637 | Mechanics of Multiple Systems |
| | | | PT | IV | 3325321638 | Modern Physics |
| | | | L | VI | 3325321654 | Educational Physics Laboratory |
| 2 | 3325321621 | Calculus | L | II | 3325331626 | Introduction to Mathematics for Physics |
| 3 | 3325321617 | Foundations of Education | L | III | 3325331629 | Physics Learning and Instruction |
| | | | L | IV | 3325331639 | Physics Learning Design |
| 4 | 3325321618 | Student Development | L | III | 3325331629 | Physics Learning and Instruction |
| | | | L | IV | 3325331639 | Physics Learning Design |
| 5 | 3325331626 | Introduction to Mathematics for Physics | PT | III | 3325321628 | Classical Mechanics |
| | | | L | III | 3325331631 | Mathematical Physics |
| 6 | 3325331629 | Physics Learning and Instruction | L | IV | 3325331639 | Physics Instructional Design |
| | | | L | VI | 3325331647 | Physics Learning Strategies |
| | | | L | VI | 3325332655 | Evaluation of Learning Processes and Outcomes |
| | | | L | VI | 3325322658 | Microteaching |
| | | | L | VII | 3325324659 | Internship – Curriculum Analysis |
| | | | L | VII | 3325324660 | Internship – Lesson Plan Development |
| | | | L | VII | 3325324661 | Internship – Learning Media Development |
| | | | L | VII | 3325344662 | Internship – Teaching Practice |
| 7 | 3325341623 | Basic Physics: Electromagnetism | L | III | 3325331632 | Electricity and Magnetism |
| | | | PT | IV | 3325321638 | Modern Physics |
| | | | L | IV | 3325331640 | Waves and Optics |
| | | | L | IV | 3325321642 | 11th Grade Senior High School Physics |
| | | | L | VI | 3325321654 | Physics Education Laboratory |
| 8 | 3325322627 | Computer Programming | L | III | 3325322633 | Computational Physics |
| | | | PT | VI | 3325241612 | Technology-Based Entrepreneurship |
| | | | L | VII | 3325532665 | Embedded Systems Programming |
| | | | L | VII | 3325522669 | Robotics |
| 9 | 3325321625 | Basic Electronics | L | III | 3325312634 | Basic Electronics Practicum |
| | | | L | IV | 3325321641 | Digital Electronics |
| | | | PT | VI | 3325321654 | Physics Education Laboratory |



| No | Code | Course Name | Prerequisite for | | | |
|----|------------|-----------------------------------|------------------|----------|------------|---|
| | | | Prerequisi sites | Semester | Code | Course Title |
| | | | L | VII | 3325532663 | PCB Design |
| | | | L | VII | 3325532665 | Embedded Systems Programming |
| | | | L | VII | 3325522667 | System Interfacing |
| 10 | 3325221611 | English | L | III | 3325321636 | English for Physics Instruction |
| 11 | 3325331640 | Waves and Optics | L | IV | 3325321642 | 11th Grade Senior High School Physics |
| 12 | 3325321624 | Thermodynamics | L | IV | 3325321643 | Statistical Physics |
| 13 | 3325331639 | Physics Learning Design | PT | V | 3325341646 | Physics Learning Media and Materials |
| | | | PT | VI | 3325332655 | Evaluation of Learning Processes and Outcomes |
| | | | L | VI | 3325322658 | Microteaching |
| | | | L | VII | 3325324659 | Internship – Curriculum Analysis |
| | | | L | VII | 3325324660 | Internship – Lesson Plan Development |
| | | | L | VII | 3325324661 | Internship – Learning Media Development |
| | | | L | VII | 3325344662 | Internship – Teaching Practice |
| 14 | 3325321630 | Basic Statistics | L | V | 3325331648 | Research Methodology |
| 15 | 3325321641 | Digital Electronics | L | V | 3325312649 | Digital Electronics Practicum |
| | | | PT | VI | 3325321654 | Physics Education Laboratory |
| | | | L | VII | 3325532663 | PCB Design |
| | | | L | VII | 3325522667 | System Interfacing |
| | | | L | VII | 3325522669 | Robotics |
| 16 | 3325321638 | Modern Physics | L | V | 3325321650 | Nuclear Physics |
| | | | L | V | 3325322651 | Physics Experiments |
| | | | L | V | 3325321652 | Introduction to Quantum Mechanics |
| | | | PT | V | 3325321653 | Solid State Physics |
| 17 | 3325321650 | Nuclear Physics | L | V | 3325322651 | Physics Experiments |
| 18 | 3325321652 | Introduction to Quantum Mechanics | L | V | 3325322651 | Physics Experiments |
| 19 | 3325312634 | Basic Electronics Practicum | PT | VI | 3325321654 | Physics Education Laboratory |
| | | | L | VII | 3325532663 | PCB Design |
| | | | L | VII | 3325522667 | System Interfacing |
| 20 | 3325312649 | Digital Electronics Practicum | PT | VI | 3325321654 | Physics Education Laboratory |
| | | | L | VII | 3325532663 | PCB Design |
| | | | L | VII | 3325522667 | System Interfacing |
| | | | L | VII | 3325522669 | Robotics |
| 21 | 3325331648 | Research Methodology | L | VI | 3325321656 | Scientific Publications in Physics Education |
| | | | L | VI | 3325323657 | Final Project Proposal Seminar |
| | | | L | VIII | 3325665671 | Final Project |



| No | Code | Course Name | Prerequisite for | | | |
|----|------------|---|------------------|----------|------------|---|
| | | | Prerequisites | Semester | Code | Course Title |
| 22 | 3325323657 | Final Project Proposal Seminar | L | VIII | 3325665671 | Final Project |
| 23 | 3325331647 | Physics Learning Strategies | L | VI | 3325322658 | Microteaching |
| | | | L | VII | 3325324659 | Internship – Curriculum Analysis |
| | | | L | VII | 3325324660 | Internship – Lesson Plan Development |
| | | | L | VII | 3325324661 | Internship – Learning Media Development |
| | | | L | VII | 3325344662 | Internship – Teaching Practice |
| 24 | 3325332655 | Evaluation of Learning Process and Outcomes | L | VI | 3325322658 | Microteaching |
| | | | L | VII | 3325324659 | Internship – Curriculum Analysis |
| | | | L | VII | 3325324660 | Internship – Lesson Plan Development |
| | | | L | VII | 3325324661 | Internship – Learning Media Development |
| | | | L | VII | 3325344662 | Internship – Teaching Practice |
| 25 | 3325341646 | Physics Learning Media and Materials | L | VI | 3325241612 | Technology-Based Entrepreneurship |
| | | | L | VII | 3325532664 | Multimedia Project Research and Design |
| | | | L | VII | 3325532666 | Digital Visual Development and Storytelling |
| | | | L | VII | 3325522668 | Multimedia Asset Design and Production |
| | | | L | VII | 3325522670 | Audio-Visual Integration in Multimedia |
| 26 | 3325322658 | Microteaching | L | VII | 3325324659 | Internship – Curriculum Analysis |
| | | | L | VII | 3325324660 | Internship – Lesson Plan Development |
| | | | L | VII | 3325324661 | Internship – Learning Media Development |
| | | | L | VII | 3325344662 | Internship – Teaching Practice |

Notes: L = Passed, PT = Previously Taken, B = Concurrent, meaning taken concurrently with a prerequisite course, L(B) = Passed with a minimum grade of B with a specified field of study.



13. Learning Management

Table 13.1 Learning management in the study programme

| No | Activity | Officer |
|----|---|---|
| 1 | Person responsible for curriculum development | Head of the study programme |
| 2 | Person in Charge of Course Materials (RPS, RAE and RT) for Courses in the Curriculum | Programme Secretary |
| 3 | PIC for monitoring and evaluation of curriculum implementation (referring to learning materials) <ul style="list-style-type: none">• Checking the alignment of questions with CLO and/or PLO• Checking the duration of assessments against the course credit weight | Programme Quality Assurance Sub-unit |
| 4 | PIC for monitoring and evaluation of the implementation of the Fulfilment of Study Load Outside the Study Programme <ul style="list-style-type: none">• Verification of the duration of activities for the Fulfilment of Study Load Outside the Study Programme• Review of the alignment of acquired competencies with PLO• Verification of the alignment of assessment formats and techniques with PLO• Review of guidelines for students, field supervisors, and programme supervisors | Coordinator for the Fulfilment of Learning Load Outside the Study Programme |
| 5 | Person in Charge (PIC) for monitoring and evaluating PLO achievement, as well as reporting on PLO achievement | Coordinator for the Fulfilment of Study Load Outside the Programme |

14. Procedures for Student Admission at Various Stages of the Curriculum

The selection process for new students at the UPGRIS, can be carried out through the following pathways.

1. Achievement Pathway

The Merit Pathway is open to high school students or equivalent who have graduated or are due to graduate in the current year, or who were declared to have graduated no more than two years previously, with specific achievements in accordance with applicable regulations.

2. Regular Pathway

The Regular Pathway is open to high school graduates or equivalent who have graduated or are due to graduate in the current year, or who were declared to have graduated no more than two years previously, through a selection process based on *a computer-based test (CBT)* and a personality test

3. Kartu Indonesia Pintar (KIP) Pathway

The Regular Pathway is open to high school graduates or equivalent who have graduated or are due to graduate in the current academic year; it is intended for prospective students from



low-income families, as evidenced by a means-test and in accordance with applicable regulations. This pathway is adopted from the government's 100% tuition fee assistance programme for students meeting specific criteria.

4. Employee Track

The Employee Pathway is specifically designed for employees who wish to continue their studies whilst working. This pathway offers flexibility in terms of lecture timetables.

5. RPL Pathway

The RPL Pathway is open to prospective students who already have a track record of prior learning, whether formal or non-formal. This prior learning record may consist of: 1) Formal education (from Diploma 1 to Bachelor's degree) evidenced by a diploma; 2) Non-formal education (training/courses) meeting specific criteria evidenced by a certificate; 3) Work experience as a practitioner meeting specific criteria evidenced by a recognised certificate of employment, which is converted into a specific number of credit points.

Registration Options

Registration options for the admission of new students at the UPGRIS, consist of offline registration and online registration.

1. *Offline* Registration

Offline registration is the registration and selection of new students conducted in person on campus. A *one-day service* is available, meaning registration, testing, and results are completed in a single day by registering directly at the PMB Counter of the University of the Teachers' Union of the Republic of Indonesia, Semarang, 2nd Floor, Central Building, Jalan Sidodadi Timur No. 24, Semarang.

2. *Online* Registration

Online registration is the process of registering and selecting new students conducted online via the website pmb.upgris.ac.id.

New Student Admission Procedures

1. Merit and Regular Streams

- a. Complete the registration form on UPGRIS Admissions website.
- b. Print the registration form.



- c. Make a payment of Rp 250,000.00 at Bank BRI, Bank Mandiri, or Bank Jateng by presenting your Registration PIN.
- d. Print the registration card from the PMB website of the UPGRIS.
- e. Take the entrance test/exam for the UPGRIS, in accordance with the designated track.
- f. Check the announcement on UPGRIS PMB *website* (within a maximum of 3 days after making the payment).

2. KIP Kuliah Pathway

- a. Register on *the website* pmb.upgris.ac.id by selecting the regular pathway under the KIP group, and complete the required data fields.
- b. Pay the registration fee of Rp. 250,000 (if accepted through the KIP selection process, the registration fee will be refunded).
- c. Synchronise your data by bringing the relevant documents (KIP application form and card, UPGRIS application form and card, KIP, KKS, PKH, SKTM, or other supporting cards from government programmes held).
- d. Take the CBT test and attend the interview at the main campus of UPGRIS, 2nd Floor, Central Building, Jalan Sidodadi Timur No. 24, Semarang. Services are available every Monday to Saturday from 07:30 to 12:00 WIB.
- e. Await the schedule for the home visit, which will be conducted by a team from the UPGRIS, and confirmed via WhatsApp.
- f. Once the selection stages have been completed, check the announcements on *the website* pmb.upgris.ac.id under the 'Announcements' menu by entering your registration number and date of birth.

3. Employee and RPL Classes

- a. Come in person to register at the Admissions Office of the UPGRIS, 2nd Floor, Central Building, Jalan Sidodadi Timur No. 24, Semarang.
- b. If the quota has not been met, prospective students will be placed on a waiting list to join the employee class programme.



15. Conclusion

The curriculum of the Physics Education Study Programme has been designed as a framework for delivering high-quality, relevant, and adaptive education in response to advancements in science, technology, and societal needs. This curriculum is intended to produce graduates who are competent, of integrity, and ready to contribute to the advancement of physics education in Indonesia.

The implementation of the curriculum requires the commitment and synergy of the entire academic community, as well as support from various stakeholders. The learning process is designed to be effective, innovative, and meaningful for students. Evaluation and refinement of the curriculum will be carried out periodically to ensure improvements in the quality of education and the achievement of the desired graduate profile.



CURRICULUM OVERVIEW

| | | | | | | | |
|------------|--|---|---|---|---|--|-----------|
| Semester 8 | Community Service Program 6 ECTS | Final Project 9 ECTS | | | | 15 ECTS | |
| Semester 7 | Internship – Teaching Practice 6 ECTS | Internship – Teaching Media Development 3 ECTS | PCB Design 4.5 ECTS | System Interfacing 3 ECTS | Multimedia Project Design and Research 4.5 ECTS | Multimedia Asset Design and Production 3 ECTS | 30 ECTS |
| | Internship – Curriculum Analysis 3 ECTS | Internship – Lesson Plan Development 3 ECTS | Robotics 3 ECTS | Embedded Systems Programming 4.5 ECTS | Digital Visual Development and Storytelling 4.5 ECTS | Audio-Visual Integration in Multimedia 3 ECTS | |
| Semester 6 | Technology-Based Entrepreneurship 6 ECTS | Physics Education Laboratory 3 ECTS | Evaluation of Learning Processes and Outcomes 4.5 ECTS | | | | 22.5 ECTS |
| | | Microteaching 3 ECTS | Scientific Publication in Physics Education 3 ECTS | Final Project Proposal Seminar 3 ECTS | | | |
| Semester 5 | Introduction to Quantum Mechanics 3 ECTS | Physics Learning Strategies 4.5 ECTS | Digital Electronics Practicum 1.5 ECTS | Physics Experiments 3 ECTS | | | 28.5 ECTS |
| | Physics Learning Media and Materials 6 ECTS | Research Methodology 4.5 ECTS | Nuclear Physics 3 ECTS | Solid State Physics 3 ECTS | | | |
| Semester 4 | Modern Physics 3 ECTS | Waves and Optics 4.5 ECTS | Philosophy of Science 3 ECTS | Applied Physics 3 ECTS | 11 th Grade Senior High School Physics 3 ECTS | | 30 ECTS |
| | Multi-Body Systems Mechanics 3 ECTS | Physics Learning Design 4.5 ECTS | Digital Electronics 3 ECTS | Statistical Physics 3 ECTS | | | |
| Semester 3 | Classical Mechanics 3 ECTS | Basic Statistics 3 ECTS | Electricity and Magnetism 4.5 ECTS | Basic Electronics Practicum 1.5 ECTS | English for Physics Instruction 3 ECTS | | 31.5 ECTS |
| | Physics Learning and Instruction 4.5 ECTS | Mathematical Physics 4.5 ECTS | Computational Physics 3 ECTS | 10 th Grade Senior High School Physics 4.5 ECTS | | | |
| Semester 2 | English 3 ECTS | Indonesian Language 3 ECTS | Thermodynamics 3 ECTS | Introduction to Mathematics for Physics 4.5 ECTS | | | 28.5 ECTS |
| | Pancasila Education 3 ECTS | Basic Physics: Electromagnetism 6 ECTS | Basic Electronics 3 ECTS | Computer Programming 3 ECTS | | | |
| Semester 1 | Religious Education 3 ECTS | Civics Education 3 ECTS | | Student Development 3 ECTS | Basic Chemistry 3 ECTS | Calculus 3 ECTS | 30 ECTS |
| | PGRI Studies 3 ECTS | | General Biology 3 ECTS | Foundations of Education 3 ECTS | Basic Physics: Mechanics and Thermals 6 ECTS | | |

Key



General & University
Compulsory Courses



Compulsory Courses



Elective Course



Thesis

ECTS = European Credit Transfer System



| Course Type | Credit Points | Semester | | | | | | | | TOTAL | | | | | | | | | |
|-------------------------------------|---|--------------|-----------------|----------------------|-----------------------|----------------------------|--------|--------|---|-----------------------|---|---|-----------|------------|--------|--------|--------|--|-------------------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | | | | | | | | | |
| University Compulsory Course | 30 | 9 | 9 | 0 | 0 | 0 | 6 | 0 | 6 | 30 | | | | | | | | | |
| Compulsory Course | 162 | 21 | 19.5 | 31.5 | 30 | 28.5 | 16.5 | 15 | 0 | 162 | | | | | | | | | |
| Elective Course | 15 | 0 | 0 | 0 | 0 | 0 | 0 | 15 | 0 | 15 | | | | | | | | | |
| Final Project, Internship, Thesis | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 9 | | | | | | | | | |
| Total ECTS Credit Points | 216.00 | 21.00 | | 15.00 | | 24.00 | | | | 216 | | | | | | | | | |
| Total SKS Credit Points | 144.00 | | | | | | | | | | | | | | | | | | |
| Legends | | | | | | | | | | | | | | | | | | | |
| Type | C = Compulsory; E = Elective | Type | Semester | Credit Points | Academic Hours | Learning Activities | | | | Weight for GPA | | | | | | | | | |
| Credit Points | ECTS Credit Points | | | | | | | | | | | | | | | | | | |
| Academic Hours | Academic Hours per Semester | | | | | | | | | | | | | | | | | | |
| Learning Activities | L = Lecture (Discussion, Presentation, Quiz, Case Method, Project Base Learning, Exam) A = Assignment E = Exercise FP= Final Project La= Laboratory Activity In=Internship Fw= Field Word | | | | | | | | | | | | | | | | | | |
| University Compulsory Course | | | | | | | | | | | | | 30 | 900 | | | | | |
| 3325121601 | Religious Education | | | | | | | | | | C | 1 | 3 | 90 | L = 26 | A = 32 | E = 32 | | 0.01388889 |
| 3325121608 | Civics Education | | | | | | | | | | C | 1 | 3 | 90 | L = 26 | A = 32 | E = 32 | | 0.01388889 |
| 3325121610 | PGRI Studies | | | | | | | | | | C | 1 | 3 | 90 | L = 26 | A = 32 | E = 32 | | 0.01388889 |
| 3325121607 | Pancasila Education | | | | | | | | | | C | 2 | 3 | 90 | L = 26 | A = 32 | E = 32 | | 0.01388889 |
| 3325121609 | Indonesian Language | C | 2 | 3 | 90 | L = 26 | A = 32 | E = 32 | | 0.01388889 | | | | | | | | | |
| 3325221611 | English | C | 2 | 3 | 90 | L = 26 | A = 32 | E = 32 | | 0.01388889 | | | | | | | | | |



| | | | | | | | | | | | |
|--------------------------|---|---|---|------------|-------------|----------|--------|--------|---------|---------|------------|
| 3325241612 | Technology-Based Entrepreneurship | C | 6 | 6 | 180 | L = 13 | A = 16 | E = 16 | La = 90 | Fw = 45 | 0.02777778 |
| 3325241613 | Community Service Program (KKN) | C | 8 | 6 | 180 | Fw = 181 | | | | | 0.02777778 |
| Compulsory Course | | | | 162 | 4860 | | | | | | |
| 3325321617 | Foundations of Education | C | 1 | 3 | 90 | L = 26 | A = 32 | E = 32 | | | 0.01388889 |
| 3325321618 | Student Development | C | 1 | 3 | 90 | L = 26 | A = 32 | E = 32 | | | 0.01388889 |
| 3325321619 | General Biology | C | 1 | 3 | 90 | L = 26 | A = 32 | E = 32 | | | 0.01388889 |
| 3325321620 | Basic Chemistry | C | 1 | 3 | 90 | L = 26 | A = 32 | E = 32 | | | 0.01388889 |
| 3325321621 | Calculus | C | 1 | 3 | 90 | L = 26 | A = 32 | E = 32 | | | 0.01388889 |
| 3325341622 | Basic Physics: Mechanics and Thermals | C | 1 | 6 | 180 | L = 40 | A = 48 | E = 48 | La = 45 | | 0.02777778 |
| 3325341623 | Basic Physics: Electromagnetism | C | 2 | 6 | 180 | L = 40 | A = 48 | E = 48 | La = 45 | | 0.02777778 |
| 3325321624 | Thermodynamics | C | 2 | 3 | 90 | L = 26 | A = 32 | E = 32 | | | 0.01388889 |
| 3325321625 | Basic Electronics | C | 2 | 3 | 90 | L = 26 | A = 32 | E = 32 | | | 0.01388889 |
| 3325331626 | Introduction to Mathematics for Physics | C | 2 | 4.5 | 135 | L = 40 | A = 48 | E = 48 | | | 0.02083333 |
| 3325322627 | Computer Programming | C | 2 | 3 | 90 | L = 13 | A = 16 | E = 16 | La = 45 | | 0.01388889 |
| 3325331628 | Classical Mechanics | C | 3 | 3 | 90 | L = 26 | A = 32 | E = 32 | | | 0.01388889 |
| 3325331629 | Physics Learning and Instruction | C | 3 | 4.5 | 135 | L = 40 | A = 48 | E = 48 | | | 0.02083333 |
| 3325321630 | Basic Statistics | C | 3 | 3 | 90 | L = 26 | A = 32 | E = 32 | | | 0.01388889 |
| 3325331631 | Mathematical Physics | C | 3 | 4.5 | 135 | L = 40 | A = 48 | E = 48 | | | 0.02083333 |
| 3325331632 | Electricity and Magnetism | C | 3 | 4.5 | 135 | L = 40 | A = 48 | E = 48 | | | 0.02083333 |
| 3325322633 | Computational Physics | C | 3 | 3 | 90 | La = 90 | | | | | 0.01388889 |
| 3325312634 | Basic Electronics Practicum | C | 3 | 1.5 | 45 | La = 45 | | | | | 0.00694444 |
| 3325321635 | 10th Grade Senior High School Physics | C | 3 | 4.5 | 135 | L = 40 | A = 48 | E = 48 | | | 0.02083333 |
| 3325321636 | English for Physics Instruction | C | 3 | 3 | 90 | L = 26 | A = 32 | E = 32 | | | 0.01388889 |
| 3325331637 | Multi-Body Systems Mechanics | C | 4 | 3 | 90 | L = 26 | A = 32 | E = 32 | | | 0.01388889 |
| 3325331638 | Modern Physics | C | 4 | 3 | 90 | L = 26 | A = 32 | E = 32 | | | 0.01388889 |
| 3325331639 | Physics Learning Design | C | 4 | 4.5 | 135 | L = 40 | A = 48 | E = 48 | | | 0.02083333 |
| — | Waves and Optics | C | 4 | 4.5 | 135 | L = 40 | A = 48 | E = 48 | | | 0.02083333 |



| | | | | | | | | | | | |
|---|---|---|---|-----------|-------------|----------|--------|---------|---------|--|------------|
| 3325321641 | Digital Electronics | C | 4 | 3 | 90 | L = 26 | A = 32 | E = 32 | | | 0.01388889 |
| 3325321642 | 11th Grade Senior High School Physics | C | 4 | 3 | 90 | L = 26 | A = 32 | E = 32 | | | 0.01388889 |
| 3325321643 | Statistical Physics | C | 4 | 3 | 90 | L = 26 | A = 32 | E = 32 | | | 0.01388889 |
| 3325321644 | Applied Physics | C | 4 | 3 | 90 | Fw = 90 | | | | | 0.01388889 |
| 3325321645 | Philosophy of Science | C | 4 | 3 | 90 | L = 26 | A = 32 | E = 32 | | | 0.01388889 |
| 3325341646 | Physics Learning Media and Materials | C | 5 | 6 | 180 | L = 40 | A = 48 | E = 48 | La = 45 | | 0.02777778 |
| 3325331647 | Physics Learning Strategies | C | 5 | 4.5 | 135 | L = 40 | A = 48 | E = 48 | | | 0.02083333 |
| 3325331648 | Research Methodology | C | 5 | 4.5 | 135 | L = 40 | A = 48 | E = 48 | | | 0.02083333 |
| 3325312649 | Digital Electronics Practicum | C | 5 | 1.5 | 45 | La = 45 | | | | | 0.00694444 |
| 3325331650 | Nuclear Physics | C | 5 | 3 | 90 | L = 26 | A = 32 | E = 32 | | | 0.01388889 |
| 3325322651 | Physics Experiments | C | 5 | 3 | 90 | La = 90 | | | | | 0.01388889 |
| 3325331652 | Introduction to Quantum Mechanics | C | 5 | 3 | 90 | L = 26 | A = 32 | E = 32 | | | 0.01388889 |
| 3325331653 | Solid State Physics | C | 5 | 3 | 90 | L = 26 | A = 32 | E = 32 | | | 0.01388889 |
| 3325321654 | Physics Education Laboratory | C | 6 | 3 | 90 | La = 90 | | | | | 0.01388889 |
| 3325332655 | Evaluation of Learning Processes and Outcomes | C | 6 | 4.5 | 135 | L = 40 | A = 48 | E = 48 | | | 0.02083333 |
| 3325321656 | Scientific Publication in Physics Education | C | 6 | 3 | 90 | L = 26 | A = 32 | E = 32 | | | 0.01388889 |
| 3325323657 | Final Project Proposal Seminar | C | 6 | 3 | 90 | La = 45 | | FP = 45 | | | 0.01388889 |
| 3325322658 | Microteaching | C | 6 | 3 | 90 | La = 90 | | | | | 0.01388889 |
| 3325324659 | Internship – Curriculum Analysis | C | 7 | 3 | 90 | In = 90 | | | | | 0.01388889 |
| 3325324660 | Internship – Lesson Plan Development | C | 7 | 3 | 90 | In = 90 | | | | | 0.01388889 |
| 3325324661 | Internship – Teaching Media Development | C | 7 | 3 | 90 | In = 90 | | | | | 0.01388889 |
| 3325344662 | Internship – Teaching Practice | C | 7 | 6 | 180 | In = 181 | | | | | 0.02777778 |
| Elective Course *only 15 ECTS elective courses are taken | | | | 15 | 1440 | | | | | | |
| 3325532663 | PCB Design | E | 7 | 4.5 | 135 | La = 136 | | | | | 0.02083333 |
| 3325532664 | Multimedia Project Design and Research | E | 7 | 4.5 | 135 | La = 136 | | | | | 0.02083333 |



| | | | | | | | | | | |
|-----------------------------|---|---|---|----------|------------|----------|--|--|--------------------|-------------------|
| 3325532666 | Digital Visual Development and Storytelling | E | 7 | 4.5 | 135 | La = 136 | | | | 0.02083333 |
| 3325522668 | Multimedia Asset Design and Production | E | 7 | 3 | 90 | La = 90 | | | | 0.01388889 |
| 3325522670 | Audio-Visual Integration in Multimedia | E | 7 | 3 | 90 | La = 90 | | | | 0.01388889 |
| 3325532665 | Embedded Systems Programming | E | 7 | 4.5 | 135 | La = 136 | | | | 0.02083333 |
| 3325522667 | System Interfacing | E | 7 | 3 | 90 | La = 90 | | | | 0.01388889 |
| 3325522669 | Robotics | E | 7 | 3 | 90 | La = 90 | | | | 0.01388889 |
| Final Project Course | | | | 9 | 270 | | | | | |
| 3325265671 | Final Project (Skripsi) | C | 8 | 9 | 270 | FP = 272 | | | | 0.04166667 |
| | | | | | | | | | TOTAL W.GPA | 1.00000000 |