	COURSE SYLLABUS OF PHYSICS EDUCATION STUDY PROGRAMME FACULTY OF EDUCATIONAL SCIENCES UIN SYARIF HIDAYATULLAH JAKARTA					Document Code MH-PFIS
COURSE	**CODE**	**CORE MODULE**	**WEIGHT (CREDITS)**	**WORKLOAD FOR EACH MODULE (IN MINUTES)**	**SEMESTER**	**COMPILATION DATE**
QUANTUM MECHANICS	FTK6019125	Compulsory	2 SKS 3 ECTS	• Lecture : 100.0 • Laboratory course: • Project work: • Independent task: 120.0 • Structured task: 120.0 • Internship: **Total : 340**	4	March 4, 2024

Language details	Indonesian
Teaching methods	Discovery Learning (DL), Self-Directed Learning (SDL)
Type of Examination	• Participation (Attendance / Quiz): 10% • Observation (Practice / Assignment): 30% • Performance (Presentation): • Oral Test (Group Assignment): • Midterm Exam: 30% • Final Exam: 30%
Module Coordinator	Erina Hertanti, S.Si, M.Si
Lecturer	Erina Hertanti, S.Si, M.Si Ai Nurlaela, M.Si.
Course Requirements	FTK6019122 Modern Physics (Have taken or are currently taking courses)
Learning Outcomes	**PROGRAMME LEARNING OUTCOME (PLO)**
	PLO1 Graduates have expertise in physics and physics learning with an approach that is appropriate to Indonesia's social, cultural and environmental context. PLO2 Graduates have the ability to manage, develop and utilize technology in physics learning PLO3 Graduates have the ability to solve physics education problems using scientific methods PLO1 Graduates have expertise in physics and physics learning with an approach that is appropriate to Indonesia's social, cultural and environmental context.
	Intended Learning Outcome (ILO)
	CPL01 Mastering Professionalism skills in Physics Education: Mastering basic educational concepts, learning theories, and physics and mathematics concepts to design, implement, and evaluate innovative physics learning by utilizing information technology and the environment; able to plan, implement and evaluate innovative physics learning, utilize ICT and the surrounding environment to develop students' critical thinking skills and scientific attitudes, apply mathematical models in explaining physical phenomena, demonstrate independent and quality performance, be responsible for the achievement of group work results, carry out supervision and evaluation, as well as communicating effectively both written and verbally in educational and research contexts, as well as demonstrating good leadership and administrative skills; and demonstrate faith and devotion to God Almighty and uphold religious, moral and ethical values in every action. CPL05 Mastering skills in the Integration of Science and Religion: Mastering the knowledge and steps for integrating religion and science as a scientific paradigm; able to apply the principles of science integration in physics learning and physics education research, communicate effectively about science integration concepts in various forums, demonstrate the ability to think critically and reflectively, document, store, secure and rediscover data to ensure validity and prevent plagiarism; and show faith and devotion to God Almighty in every aspect of life, and respect religious values.
	Course Learning Outcome (CLO)
	CPMK01.63.40 Mastering the principles and concepts of introduction to Quantum Mechanics, Wave mechanics: Schrodinger's Equation, Interpretation of wave functions, Wave normalization, Eigen values, Eigen functions, Operators and expectation prices. Introduction to New Materials Solutions to Schrodinger's equation: Free particles, Ladder potential, Potential wells and breakthrough effects, Simple harmonic oscillator, Hydrogen atom, Angular momentum, Covariance formulation. with logical, critical and independent thinking and upholding religious, moral and ethical values. CPMK05.63.104 Mastering the knowledge and steps for integrating religious and scientific knowledge on the topic of introducing Quantum Mechanics, Wave mechanics: Schrodinger's Equation, Interpretation of wave functions, Wave normalization, Eigenvalues, Eigenfunctions, Operators and expectation prices. Introduction to New Material Solutions to the Schrodinger equation: Free particles, Ladder potential, Potential wells and breakthrough effects, Simple harmonic oscillator, Hydrogen atom, Angular momentum, Formulation of covariance with critical

	and reflective thinking and showing faith and devotion to God Almighty
	Sub-CLO
	SUB-CPMK01.63.40.02.01 Students can learn about the basic principles of quantum mechanics SUB-CPMK01.63.40.02.02 Students can derive the Schrodinger equation SUB-CPMK01.63.40.02.03 Students can explain the probability interpretation of the wave function SUB-CPMK01.63.40.02.04 Students can perform normalization on wave functions SUB-CPMK01.63.40.02.05 Students can explain the concept of eigenvalues and eigenfunctions in quantum mechanics SUB-CPMK01.63.40.02.06 Students can explain the role of operators in quantum mechanics SUB-CPMK01.63.40.02.07 Students can solve the Schrodinger equation for free particles SUB-CPMK01.63.40.02.08 Students can explain the quantum behavior of particles in a ladder potential SUB-CPMK01.63.40.02.09 Students can explain potential wells and breakthrough effects SUB-CPMK01.63.40.02.10 Students can explain the simple harmonic oscillator SUB-CPMK01.63.40.02.11 Students can explain the hydrogen atom SUB-CPMK01.63.40.02.12 Students can explain Angular Momentum SUB-CPMK01.63.40.02.13 Students can explain the concept of covariance formulation in special relativity SUB-CPMK05.63.104.01.01 Students can demonstrate behavior that reflects faith and devotion in every action and daily activity SUB-CPMK05.63.104.01.02 Students can demonstrate an attitude of responsibility and independence in carrying out tasks and work in their field of expertise SUB-CPMK05.63.104.03.01 Students can use mathematical models to explain physical phenomena SUB-CPMK05.63.104.03.02 Students can display independent and measurable work performance of adequate quality SUB-CPMK05.63.104.03.03 Students can make appropriate and effective decisions based on information and data analysis
Brief Description of the Course	This course is a Compulsory course in the Physics Education Program. The topics covered in this course include Modern physics and quantum physics. The type of lecture used is 60% Lectures, Tutorials, Responses (40% conducted synchronously and asynchronously) with the method Discovery Learning (DL), Self-Directed Learning (SDL), conducted through Scientific, Contextual.
Scientific Integration	4. reconstructing auxiliary sciences; 6. provide Islamic values as a basis and reference in the application of knowledge; 8. look for relationships and points of contact between natural sciences and the texts of the Koran and hadith, 9. make the text of the Koran and hadith a source of inspiration or a reference source for the development of knowledge; 10. connecting the order of natural law with the greatness of its creator, namely Allah SWT; and/or

Research and Community Service Integration	
Learning Materials	Modern physics and quantum physics
References	Dürr, D. dan Lazarovici, D. (2020). Understanding Quantum Mechanics. New York: Springer