MODULE HANDBOOK

Course:	**Quantum Physics**
Module Level:	Undergraduate
Code:	FIT301
Sub-heading, if applicable:	-
Courses included in the module, if applicable:	-
Semester/Term:	5th / Third Year
Module Coordinator:	Febdian Rusydi, Ph.D.
Lecturer(s):	Febdian Rusyd,i Ph.D.; Andi H. Zaidan, Ph.D.; Adri Supadri, M.S. and Arif Wibowo, M.Si.
Language:	Bahasa Indonesia
Classification within the Curriculum :	Compulsory Course / ~~Elective Course~~
Teaching format / class hours per week during semester:	4 hours of lectures (50 min / hour)
Workload:	4 hours of lectures, 4 hours of structural activities, 4 hours of individual study, 13 weeks per semester, and total of 156 hours per semester ~ 5.2 ECTS*
Credit Points:	4
Requirement(s):	(FIT202) Mathematical Physics II
Learning Goals/Competencies:	**General Competence (Knowledge) :** Students are able to describe the hydrogen atom using Schrödinger equation. **Specific Competence:** 1. Students are able to explain quantum theory for particles as waves, where the primary equation of motion is given by Schroedinger equation. 2. Students are able to to describe the hydrogen atom using Schrödinger equation. 3. Students understand about identical particle system treatment with quantum physics and also understand about application of hydrogen atom model with spin concept, in atoms and solid.
Contents:	FIT 301 – Quantum Physics, a 4-SCU course, is an introductory course to understand quantum theory that governs all phenomena in the microscopic world. In general, particles with the size is less than 10^{-6} m, where their mass is insignificant to the gravitational force, are object to quantum theory. It implies that biological systems such as protein and DNA, chemical compounds from complex to simple ones such as molecule, and atoms and all elementary particles are all in the range of quantum theory. Quantum theory born from the fact that classical physics that governs our common sense does not work in the microscopic world. The blackbody radiation, for instant, cannot be explained by classical

	physics alone. Not to mention the photoelectric effect. And the ultimate failure of classical physics comes when classical physics fails to explain the nature of hydrogen atom. To deal with that problem, quantum theory allows a particle to be identified as a wave, while a wave may be identified as a particle. This extra identity makes the certainty event in our daily-life become uncertainty in the quantum world. Time is no longer need to go forward; a ball does not necessary bounce back when hitting wall, it can pass through it; and a particle can be present and be absent at the same time. This course intends to study the quantum theory for particles as waves where the primary equation of motion is given by Schroedinger equation. The aim of this course is to describe the hydrogen atom using Schrödinger equation. To achieve this, we design the course by following our chosen textbook. We begin with the discussion of wavefunction interpretation in quantum theory, then proceed to getting familiar with Schroedinger equation for simple case and finally applying Schrödinger equation to hydrogen atom. In the end part of the lecture, we introduce the identical particle system treatment with quantum physics where spin concept plays important role. We discuss two applications of hydrogen atom model with spin concept: atoms and solid.
Soft Skill Attribute:	Effort and ethic.
Study/Exam Achievements:	Passing grade is D (equivalent of score 40.0 of 100.0). The score is determined by 10 quizzes which are distributed in the semester. Maximum score for each quiz is 10. The quiz will take 15 – 20 minutes. There will be 10 homework sets in the semester. Each homework set contains 10 problems. The homework is not to be submitted, but one of the problems will be ask in the quiz. Score to grade conversion: A : 75 - 100 AB : 70 - 74.99 B : 65 - 69.99 BC : 60 - 64.99 C : 55 - 59.99 D : 40 - 54.99 E : 0 - 39.99
Forms of Media:	Whiteboard, projector.
Learning Methods :	Lecturing, homework, tutorial
Literature (s) :	David J. Griffiths, 2004*, Introduction to Quantum Mechanics*, 2nd edition, Prentice Hall.

Notes:	*Total ECTS = {(total hours workload × 50 min) / 25 hours Each ECTS is equals with 25 hours.