Undergraduate Programme of Physics Education **Module Handbook**

Module Name :	*Fisika Kuantum* Quantum Physics
Module level :	Bachelor degree/Undergraduate Programme
Course Code :	8420303069
Abbreviation, if applicable:	-
Courses included in the module, if applicable:	Not Applicable
Semester/Term	5/Third Year
Module coordinator(s)	Dr. Z. A. Imam Supardi, M.Si.
Lecturer(s):	Tjipto Prastowo, Ph.D. Utama Alan Deta, M.Pd., M.Si.
Language:	*Bahasa Indonesia*
Classification within the curriculum:	Compulsory/ ~~Elective~~
Teaching format/class hours per week during the semester:	4 contact hours of lectures (Indonesia credit semester or sks*)
Workload :	4 x 50 minutes lectures, 4 x 60 minutes structured activity, 4 x 60 minutes individual activity, 14 weeks per semester, 180 total hours per semester ~ 6.36 ECTS**
Credit Point:	4 sks (6.36 ECTS)
Requirements:	Modern Physics
Learning goals/competencies:	1. Demonstrating independent, creative and honest characters in doing student assignments, mid and final exams. 2. Understanding theoretical concepts of quantum physics in general and the Heisenberg uncertainty principle for microscopical systems, and the Schrodinger wave mechanics comprehensively. 3. Being able to formulate problem solving for procedural problems related to the applications of concepts of quantum physics with the Heisenberg uncertainty principle and the Schrodinger wave mechanics for reformulation of hydrogen atom and hydrogen-like atoms.
Content	Quantum Physics examines the history of quantum concepts from empirical observations to theoretical approaches, the use of the Schrodinger wave mechanics to solve physics problems related to dynamics of microscopic particles with and without external influence of potential field, hydrogen atom theory revisited through complete solutions derived from the 3D Schrodinger wave equation in the spherical coordinate system (radial and angular components), the roles of spin-orbit coupling in

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<tr><td></td><td>controlling fine and hyperfine structures, Zeeman and Stark effects.</td></tr>
<tr><td>Attribute Soft skill:</td><td>Scientific report, public speaking, and team work</td></tr>
<tr><td>Study/exam achievements:</td><td>Students are considered to complete the course and pass if they obtain at least 40% of maximum final grade. The final grade (NA) is calculated based on the following ratio:
<table>
<tr><th>Assessment Components</th><th>Percentage of contribution</th></tr>
<tr><td>Participation</td><td>20%</td></tr>
<tr><td>Assignment</td><td>30%</td></tr>
<tr><td>Mid-semester test</td><td>20%</td></tr>
<tr><td>Final semester test</td><td>30%</td></tr>
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<tr><td>Learning Methods :</td><td>Student-centered approach, lecture and discussion, and presentations (structured activities)</td></tr>
<tr><td>Form of Media:</td><td>Power Point slides, e-book file, and multimedia.</td></tr>
<tr><td>Literature (primary references):</td><td>1. Prastowo, T. and Rahmawati, E. 2014. Lecture Notes on Quantum Physics. Unpublished work.
2. Zettili, N. 2009. Quantum Mechanics. West Sussex, UK: John Wiley and Sons.
3. Grifftiths, D. J. 1995. Introduction to Quantum Mechanics. New Jersey, US: Prentice-Hall.
4. Gasiorowicz, S. 1996. Quantum Physics. New York, US: John Wiley and Sons.
5. Liboff, R. 1980. Introductory Quantum Mechanics. Reading, US: Addison-Wesley.
6. McMahon, D. 2005. Quantum Mechanics demystified. New York, US: McGraw-Hill.
7. Some power point files and/or course materials relevant to Quantum Physics from the internet</td></tr>
<tr><td rowspan="2">Notes:</td><td>*1 sks in learning process = three periods consist of: (a) scheduled instruction in a classroom or laboratory (50 minutes); (b) structured activity (60 minutes); and (c) individual activity (60 minutes) according to the Regulation of Indonesia Ministry of Research, Technology, and Higher Education No. 44 Year 2015 jo. the Regulation of Indonesia Ministry of Research, Technology, and Higher Education No. 50 Year 2018.</td></tr>
<tr><td>**1 sks = 1,59 ECTS according to Rector Decree Of Universitas Negeri Surabaya No. 598/Un38/Hk/Ak/2019</td></tr>
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