

## MODULE HANDBOOK

Course:	<b>Modern Physics</b>
Module Level:	Bachelor
Code:	FID201
Sub-heading, if applicable:	-
Courses included in the module, if applicable:	-
Semester/Term:	3 <sup>th</sup> / Second Year
Module Coordinator:	Andi Hamim Zaidan M.Si., Ph.D.
Lecture(s):	Prof. Dr. Retna Apsari, M.Si.; Andi Hamim Zaidan M.Si., Ph.D.; Dr. Aminatun, Ir.,M.Si and Dr. Suryani Dyah Astuti, M.Si.
Language:	Bahasa Indonesia
Classification within the Curriculum:	Compulsory Course / <del>Elective Studies</del>
Teaching format/class hours per week during the semester:	4 hours of lectures (50 min/hour)
Workload:	4 hours of lectures, 4 hours of structural activities, 4 hours of individual study, 14 weeks per semester, and total of 168 hours per semester (~5.6 ECTS*)
Credit Points	4
Requirement(s):	Physics II (FID116), Mathematical Physics I (FIT201)
Learning Goals/Competencies:	<p><b>General Competence (Knowledge):</b></p> <ol style="list-style-type: none"> <li>1. Understand the concepts of Minkowskian space-time, Four-vectors, Four-Vector Scalar Products, Invariant Intervals and tensors.</li> <li>2. Understand the postulates in Einstein Theory of Special Relativity and their implications including Proper Time and Proper Velocity.</li> <li>3. Understand the basic concept of General Relativity.</li> <li>4. Understand the basic concept of quantum theory (thermal radiation and Planck's postulate, particle like properties of radiation, wavelike properties of particles, models of atom).</li> <li>5. Understand the basic concept of schrodinger's theory of quantum mechanics.</li> </ol> <p><b>Specific Competence:</b></p> <ol style="list-style-type: none"> <li>1. Able to analyze and solve kinematical problems using postulates in Einstein Theory of Special Relativity.</li> <li>2. Able to analyze and solve kinematical and dynamical problems in Minkowskian space-times using the concepts of four-vectors and tensors.</li> <li>3. Able to analyze and solve Relativistic Electrodynamics in Minkowskian space-times using the concepts of four-vectors and tensors.</li> <li>4. Able to analyze and solve thermal radiation problem.</li> <li>5. Able to analyze and solve wave-particle duality</li> </ol>

	<p>problem.</p> <p>6. Able to analyze and solve time-independent Schrodinger equation.</p>
Contents:	<p>After finishing this course, student has enough knowledge about <b>Special relativity</b>: Einstein postulates in special relativity and their implications, Four-Vectors, Four-Vector Scalar Products, Invariant Intervals, Minkowski Space-Time Diagrams, Proper Time, Proper Velocity, The Energy-Momentum 4-Vector, Relativistic Kinematics, and Relativistic Electrodynamics, basic of General relativity.</p> <p><b>Quantum physics</b>: thermal radiation and Planck's postulate, particle like properties of radiation, wavelike properties of particles, models of atom, Schrodinger's theory of quantum mechanics, solution of time-independent Schrodinger equation.</p>
Soft Skill Attribute:	Effort and ethic.
Study/Exam Achievement:	<p>Students are considered to be competent and passed if at least get 50% of maximum mark of the midterm test, final examination, quizzes and home work.</p> <p>Final score is calculated as follow: 35% Exam I + 35% Exam II + 20% Homework + 10% Quiz</p> <p>Final index is defined as follow :</p> <p>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</p>
Learning Methods:	Lectures and assessments
Forms of Media:	Powerpoints slides, LCD projectors and whiteboards.
Literature(s):	<ol style="list-style-type: none"> <li>1. Griffiths, David J. 1998. Introduction to Electrodynamics. 3rd ed.</li> <li>2. Upper Saddle River, NJ: Prentice Hall. (Chapter 1 and 2).</li> <li>3. B.F. Schutz, 1985, A First Course in General Relativity, Cambridge University Press. (chapter 1-3).</li> <li>4. R. Eisberg, 1985, Quantum Physics of Atoms, Molecules, Solid, Nuclei, and Particle, John Wiley &amp; Sons (chapter 1-6).</li> </ol>
Notes:	<p>*Total ECTS = {(total hours workload × 50 min) / 25 hours Each ECTS is equals with 25 hours.</p>