Elementary Physics

Module name		Elementary Physics				
Module level		1st year of Bachelor program				
Abbreviation, if applicable						
Sub-heading, if applicable						
Courses included in the module, if applicable		FI 1102 Elementary Physics 1B FI 1202 Elementary Physics 2B				
Semester/term		1st and 2nd semesters				
Module coordinator(s)		Dr. Enjang J. Mustopha				
Lecturer(s)		Dr. Enjang J. Mustopha				
Language		Indonesian				
Classification within the Curriculum		Compulsory courses for Bachelor Program in Biology				
Teaching format/ class hours per week during the semester		• Lecture : 3 hours x 16 weeks per semester • Tutorial: 2 hours x 16 weeks per semester • Practical class: 2 hours x 16 weeks per semester				
Workload	Total Workload	296 hours; 2 courses x 3 CU				
		Face to face teaching	Structured activities	Independent study	Exam	Total
	Lecture	96	-	64	8	168
	Tutorial	-	64	-	-	64
	Practical class	-	64	-	-	64
	Total					**296**
Credit points		*Elementary Physics IB (3 CU) & Elementary Physics 2B (3 CU)*				
Requirements						
Content		1. Elementary Physics 1B This course activities consist of lectures and practice with scope: • Kinematics of Point Objects • Relative Motion • Dynamics of Point object (Newton's laws of the force concept, work and energy, impulse and momentum, conservation laws) • Dynamics System of point Objects (center of mass) • Rotational motion (angular momentum, rigid body rotation with a fixed axis) • Elasticity and Oscillations • Statics and Fluid Dynamics • Thermophysics (kinetic theory of gases, heat and work, the first law of thermodynamics , efficiency, Carnot cycle) 2. Elementary Physics 2B This course activities consist of lectures and practice with scope: • Electrostatic (electric field, Coulomb Law) • Electric Potential Energy • Electrical Potential • Capacitor • Magnetism • Electromotive force • Alternating Current, Electromagnetic Wave • Modern Physics • Atomic Physics				

Learning goals/ competencies	*After completion of this module students are expected to be able to:* 1. Elementary Physics 1B Knowledge • Describe the concept of vectors and basic concepts and principles in mechanics, fluid, and thermodynamics. Skills • Plan and prepare practical laboratory investigations on Newton mechanics. • Apply experiments and record data using a variety of suitable instruments for Newton mechanics experiments • Apply experiments in a responsible and compliance way to the relevant health and safety regulations Competence • Apply the Newton's laws for a single particle and for a system of particles in 1, 2, and 3 dimensions. • Apply the concept of work-energy for solving simple problems in mechanics. • Formulate, solve and analyze problems of statics and dynamics of rigid body systems. • Solve problems in statics and dynamics of fluids. • Solve and analyze problems in thermodynamics. • Demonstrate an ability to analyze and interpret experimental data on Newtonian mechanical experiments using knowledge of mathematics and physics • Design a simple device that uses the concepts of elementary Physics IB (RBL) 2. Elementary Physics 2B Knowledge • Describe the basic concepts and principles in electromagnetism and modern physics. Skills • Conduct experiments in measuring the magnitude of magnetic fields inside a solenoid • Conduct experiments in measuring effective current and potential of an alternating current (AC) • Prepare ampere meter and voltmeter on a direct current (DC) source and analyze the Wheatstone bridge. • Conduct experiments in a interference and diffractions Competence • Compute the Coulomb force and electric field generated by discrete and continuous charges, including the application of Gauss's law. • Compute potential energy and electric potential due to discrete and continuous charges and apply it on capacitors • Compute the magnetic field generated by a current-carrying wire (Biot-Savart law and Ampere law) • Apply the Faraday and Lenz's law of magnetic induction to generate electromotive Force (EMF) • Solve direct current (DC) and alternating current (AC) problems • Explain the quantities of electromagnetic waves, wave energy, wave power and wave intensity • Solve problems on interference pattern of *N*-slit and the diffraction pattern for width-slit and N-slit (interferention-diffraction) • Solve problems on Einstein's special relativity and wave- particle dualism • Analyze an experiment of modern Physics (photoelectric effect) • Design a simple device that uses the concepts of elementary Physics IIA (RBL)
Study/exam achievements	• *Midterm exam* • *Final exam* • *Practical class* • *Quizzes* • *Student class project* • *Research based learning*

Forms of media	*Classical teaching tools:*	*white board/ chalk and talk, power point*
	Integrated teaching tools:	
	Digital teaching tools:	
	Problem based teaching tools:	*Research based learning, laboratory work*
Literature	1. Cutnell, J.D. & Johnson, K.W. 2001. *Physics*. John Wiley & Sons. 2. Giancoli. 1998. *Physics*. Prentice Hall. 3. Bueche, F.J. & Jerde, D.A. 1995. *Principles of Physics*. McGraw-Hill.	