1. Module I: Basic Science I

1.1. Module Data

Person in charge	Faculty of Natural Sciences and Mathematics
Total Credits	9
Course	FI 1102 Elementary Physics 1B
	KI 1101 Basic Chemistry 1A
	MA 1102 Mathematics 1B
Modul Examination	Written Test

1.1.1. Sub-module I: Elementary Physics 1B

Module Name:	Elementary Physics 1B
Module Level:	Undergraduate
Abbreviation, if applicable:	FI 1102
Sub-heading, if applicable:	
Courses included in the module, if applicable:	
Semester/term:	1
Module coordinator(s):	Dr. Enjang J. Mustopha
Lecturer(s):	
Language:	Bahasa Indonesia
Classification within the curriculum:	General Studies / ~~Major Subject~~ / ~~Elective Studies~~
Teaching format / class hours per week during the semester:	3 hours lectures, 2 hours tutorial
Workload:	3 hours lectures, 2 hours tutorial and structured activities, 2 hours individual study, 2 hours laboratory work per week, 16 weeks per semester, and total 144 hours a semester
Credit Points:	3
Requirements:	-
Learning goals/competencies:	Knowledge – define and 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. – conduct experiments and record data using a variety of suitable instruments for Newton mechanics experiments

	– conduct experiment 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 analyse problems of statics and dynamics of rigid body systems. – solve problems in statics and dynamics of fluids. – solve and analyze problems in thermodynamics. – 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)
Content:	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)
Study/exam achievements:	Students are considered to be competent and pass if at least get 50% of maximum mark of the exams, homework, laboratory work, and research based learning.
Forms of Media:	Slides and LCD projectors, blackboards, lab.
Literature:	1. Cutnell, J.D. & Johnson, K.W. *Physics*. John Wiley & Sons, 2001 2. Giancoli. *Physics*. Prentice Hall, 1998. 3. Bueche, F.J. & Jerde, D.A. *Principles of Physics*. McGraw-Hill, 1995.
Notes	The course is less calculus based as compared to FI1101 Elementary Physics 1A

1.1.2. Sub-module II: Basic Chemistry 1A

Module Name:	Basic Chemistry 1A
Module Level:	Undergraduate
Abbreviation, if applicable:	KI 1101
Sub-heading, if applicable:	
Courses included in the module, if applicable:	
Semester/term:	1
Module coordinator(s):	Dr. Bambang Prijamboedi
Lecturer(s):	
Language:	Bahasa Indonesia
Classification within the curriculum:	General Studies / ~~Major Subject~~ / ~~Elective Studies~~
Teaching format / class hours per week during the semester:	3 hours lectures, 1 hour tutorial, 3 hours experimental works.
Workload:	3 hours lectures, 4 hours tutorial and experimental works, 3 hours individual study per week, 16 weeks per semester, and total 160 hours a semester
Credit Points:	3
Requirements:	-
Learning goals/competencies:	• Knowledge – Identify the atoms, elements, ionic compounds, molecular compounds. – Define the concept of mole, limiting reactions and reaction yields. – Indentify electrolytes, acids and bases, and understand the acid-base nomenclature, molarities and reactions in solution. – Identify the oxidation and reduction reactions. – Understand the concept of energy and its relation with the chemical change, works, internal energy, first law of thermodynamics, Hess's law. – Understand the concept of entropy, second and third law of thermodynamics, Gibbs free energy, bond energy. – Understand the atomic spectra, the Bohr theory, wave model of atom, spin, atomic orbital. – Identify ionic bonding, covalent bonding and understand the concept of polar molecule, Lewis structure. – Identify the geometry of molecular structure, bonding types in molecules and matters. – Understand the ideal and real gas law, Dalton's gas law.

	– Understand the intermolecular forces in materials, Le chatelier principle. – Indentify the structure of crystalline solids, crystal types and its physical properties. • Skills – define the relation between chemical reactions in molecular scale and macroscopic scale such as mass, empirical and molecular formula. – Apply titration methods and several chemical analyses to solve some problems related to the solution properties. – Apply balancing the oxidation-reduction reactions and calculate the mass involved in the oxidation-reduction reaction. – Asses the amount of heat that related to a chemical reaction – Define the molecular structure and its geometry for a chemical compound. • Competences – Describe the relation between microscopic world in molecular level and macroscopic level through the mole and stoichiometry concepts, theory and description of atoms and molecules and its relation with the properties of materials. – Apply some basic chemical analytical method to understand and explain some chemical phenomena and also to indentify the chemical properties of common chemical substances.
Content:	Atoms, elements and compounds; Concepts of mole and stoichiometry; Reaction in aqueous solution; Oxidation-reduction reactions; Energy and chemical reaction; Thermodynamics; Theory of atoms based on quantum mechanics; Chemical bonding; Molecular structure; Properties of gases; Intermolecular force and properties of liquids and solids.
Study/exam achievements:	Students are considered to be competent and pass if at least get 48% of maximum mark of the exams and tasks. Final grades are calculated from 40% of mid- term exam, 40% of end semester exam, 10% of quizzes and 10% of experimental works.
Forms of Media:	Slides, Beamer, boards, internet, exercises, laboratory.
Literature:	1.James E. Brady, Neil D. Jespersen and Alison Hyslop, Chemistry 6th Edition, John Wiley and Sons, 2012. 2.Raymond Chang, Chemistry 10th Edition, McGraw-Hill, 2010.

1.1.3. Sub-module III: Mathematics 1B

Module Name:	Mathematics 1B
Module Level:	Undergraduate
Abbreviation, if applicable:	MA 1102
Sub-heading, if applicable:	
Courses included in the module, if applicable:	
Semester/term:	1
Module coordinator(s):	Drs. Warsoma Djohan, M.S.
Lecturer(s):	
Language:	Bahasa Indonesia
Classification within the curriculum:	General Studies / ~~Major Subject~~ / ~~Elective Studies~~
Teaching format / class hours per week during the semester:	3 hours lectures, 2 hours tutorial
Workload:	3 hours lectures, 3 hours tutorial and structured activities, 3 hours individual study, 16 weeks per semester, and total 144 hours a semester
Credit Points:	3
Requirements:	-
Learning goals/competencies:	After the course students hopefully have the following: Knowledge – Discover the interaction between mathematics and other fields that they will learn in their study programs – Apply Basic technical ability on the appropriate concepts, formulae, methods, and thinking Skills – Sapply ystematic, logical, and critical thinking; creative in solving problems related to concepts in Mathematics iB – Ability to communicate their works and their thinking orally and in written papers. Competence – Readiness to learn other courses that need calculus for life sciences as the prerequisite.
Content:	This course is of calculus primarily for students in the biological or life sciences. The course has similarities with the usual first semester calculus but differs in that it focuses on modeling life sciences processes. We attempt to motivate and illustrate a great deal of the mathematics in the course with biological problems. We begin by introducing the notion of a limit. Limits are

	essential to defining derivatives and integrals. Nonetheless, the treatment is non theoretical. The emphasis of the approach is on ideas, techniques, and applications to the life sciences. By the end of the semester students should know precise definitions of the derivative and the integral and understand the fundamental theorem of calculus which gives the relation between the derivative and the integral. We will illustrate the methods and ideas of calculus by studying several problems from biology. We will study the interpretation of the derivative as a rate of change, and model growth and declines of populations.
Study/exam achievements:	Students are considered to be competent and pass if at least get 50% of maximum mark of the exams, homework, and other assignments.
Forms of Media:	Slides and LCD projectors, blackboards
Literature:	1. Marvin L. Bittinger, Neal Brand, dan John Quintanilla, *Calculus for the Life Sciences,*Pearson, 2005. (main reference) 2. Claudia Neuhauser, *Calculus for Biology and Medicine,* International Edition., Prentice Hall, 2004. 3. George B. Thomas, Maurice D. Weir, Joel Hass, *Thomas' Calculus*, 12th edition, Pearson, 2010. 1. Dale Purcell, Edwin J. Purcell, Steven E. Rigdon, *Calculus*, 9th Edition, Pearson Prentice Hall, 2007.
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