Module Handbook

Module Name:	Waves
Module Level:	Bachelor
Abbreviation, if applicable:	FI 3101
Sub-heading, if applicable:	
Courses included in the module, if applicable:	
Semester/term:	Fifth semester / third year
Module coordinator(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:	4 hours lectures
Workload:	4 hours lectures, 4 hours structured activities, 4 hours individual study, 16 weeks per semester, and total 192 hours a semester
Credit Points:	4
Requirements:	1. FI2101 Mechanics 2. FI2102 Mathematical Physics IA 3. FI2202 Mathematical Physics IIA 4. FI2002.Electricity & Magnetism
Learning goals:	Knowledge - Demonstrate knowledge in the theoretical concept of oscilation and waves that serve as the basis to understand the physical phenomena of waves in 1D, 2D and 3D and the laws underlying the waves phenomena - Demonstrate knowledge of the physical parameters and quantities related to waves in order to understand the behaviour of waves such as reflection and transmission, and energy flow. - Demonstrate knowledge of the physical phenomena specific to waves such as : modulation, interferences and diffraction Skills - Demonstrate ability to recognize physical systems which leads to oscillation or waves and solve the differential equation of oscillatory harmonic motions and waves for both mechanical waves and electromagnetic waves. - Demonstrate ability to use Fourier Transform to analyse modulation in waves. - Demonstrate ability to formulate and compute the reflection and transmission coefficient, and the related energy flow. - Demonstrate ability to formulate and use superposition principles for analysing waves interferences. - Demonstrate ability to formulate and analyse interference-diffraction phenomena for far and near fields. - Demonstrate ability to formulate and analyse waveguide mode for 1D planar waveguide.
Content:	Simple harmonics motion including friction and force oscillation and coupled oscillators. Wave equations on a string, sound waves and electromagnetic waves. Wave functions and physical parameters of travelling waves: the transversal and longitudinal waves. EM waves: harmonic plane wave solution in vacuum, dielectric and conducting media. Waves behaviour in the interface

	between media : reflection and transmission on a rope and semi infinite plane for EM wave. Impedance matching criteria. Fourier transform. Modulation of waves. Coherence and superposition principle of waves : wave front splitting (e.g Michelson interferometer) and amplitude splitting interferometers (e.g Fabry-Perot) . Diffraction of an aperture : 1D case and 2D cases, the near field case and the far field case. Interference-Diffraction of N identical slits. Eigenmode equation of simple planar waveguide and its solutions: cut off frequency, field profile etc.
Study/exam achievements:	Students are considered to be competent and pass if at least get 50% of maximum mark of the exams, homework, and quiz.
Forms of Media:	Slides and LCD projectors, and blackboards
Literature:	1. Physics of Wave by William C. Elmore and Mark A. Heald, Published by Dover 2. The Physics of Vibration and Waves by H.J. Pain, published by John Willey and Sons 3. Gelombang, M.O. Tjia, Published by Dabara
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