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Undergraduate Programme in Physics

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MODULE HANDBOOK

Module Name	Optics and Waves
Module level, if applicable	Bachelor
Code, if applicable	FIS 414015
Subtitle, if applicable	-
Courses, if applicable	Wave and Optics
Semester(s) in which the module is taught	4st (Fourth)
Person responsible for the module	Dr. Widayanti, M.Si
Lecturer(s)	Dr. Widayanti, M.Si
Language	Indonesia
Relation to curriculum	compulsory course in the second year (4st semester) Bachelor Degree
Type of teaching, contact hours	150 minutes lectures, 170 minutes practicum and 180 minutes structured activities per week.
Workload	Total workload is 181,3 hours per semester, which consists of 150 minutes lectures per week for 14 weeks, 170 minutes practicum per week, 180 minutes structured activities per week, 180 minutes individual study per week, in total is 16 weeks per semester, including mid exam and final exam
Credit points	4
Requirements according to the examination regulations	Minimum attendance 75% All assignments submitted Attendance on time
Recommended prerequisites	Elementary Physics II, Mathematical Physics II
Module objectives/intended learning outcomes	After completing this course, the students: CO 1. Able to explain the concepts of optics and waves. CO 2. Able to explain about harmonic vibrations, one-dimensional, two-dimensional, and three-dimensional waves, sound waves, electromagnetic waves, modulation, polarization, interference, diffraction, lasers, and holography.. CO 3. able to understand the basics of mechanical waves and electromagnetic waves. CO 4. Able to formulate physics problems related to optics and wave concepts CO 5. Know and are able to explain the applications of optics and wave concepts.
Content	Properties of Light, Law of Reflection, Law of Refraction Snell's Law, Huygens' Principle, Fermat's Principle, and Total Internal Reflection (TIR) Optical Systems, Lens Systems, and Types of Aberrations Principle of Wave Superposition, and Non-Periodic Waves

	Principle of Light Polarization, Polarizer, Dichroism, Birefringence, Polarization by Reflection
	Principle of Light Interference, Michelson and Mach-Zehnder Interferometers
	Principle of Diffraction, Fraunhofer Diffraction, and Fresnel Diffraction
	Coherence Function, Degree of Coherence, Coherence, and Stellar Interferometry
	Optoelectronics: Photodiode, LED, and LD (Laser Diode)
	Laser Systems and Fiber Optics
	Simple Harmonic Motion, Damped, and Forced Oscillations
	Coupled Oscillators
	Mechanical Wave Equation and Electromagnetic Wave Equation
	Wave Function and Physical Parameters of Traveling Waves
	Wave Properties at Medium Boundaries: Reflection and Transmission in Strings and Semi-Infinite Planes for EM Waves
	Polarization of Electromagnetic Waves
	Light Propagation in Medium and Between Media, Fermat's Principle, Effect of Medium Anisotropy
Study and examination requirements and forms of examination	The final mark will be weighted as follows:

NO	Assessment methods (components, activities)	Weight (percentage)
1	Final Examination	25%
2	Mid-Term Examination	25%
3	Class Activities : Quiz, Homework, etc.	15%
4	Project Based Learning (PBL)	10%
5	Practicum	25%

The final assessment is expressed in the form of a letter value converted from a number value with the following categories:

NO	Number Value	Letter Value	NO	Number Value	Letter Value
1	≥ 95	A	7	65-69.99	B/C
2	90-94.99	A-	8	60-64.99	C+
3	85-89.99	A/B	9	55-59.99	C
4	80-84.99	B+	10	50-54.99	C-
5	75-79.99	B	11	55-34.99	D
6	70-74.99	B-	12	<35	E

Media employed	White-board, LCD Projector, Laboratory, e-learning (https://daring.uin-suka.ac.id/)
Reading list	1. Eugene Hecht, Optics Fourth Edition, Addison Wesley, 2002. 2. Frank L. Pedrotti and Leno S. Pedrotti, Introduction to Optics: Second Edition, Prentice-Hall, Inc., 1993 3. Jenkins F.A., White H.E., Jenkins F., White H. Fundamentals of Optics (MGH Science Engineering Math, 2001)

		4. AjoyGhatak, Optics, Mc Graw-Hill

PLO and CO Mapping

	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9
CO 1		√							
CO 2		√	√						
CO 3		√							
CO 4				√	√				
CO 5				√	√				