Module Name	MODERN OPTICS
Modul Level	Undergraduate
Code	18H02130203
Courses (if applicable)	Bachelor of Physics
Semester	5rd
Person responsible for the module	Prof. Dr. Syamsir Dewang, M.Eng.Sc.
Lecturer	Prof. Dr. Syamsir Dewang, M.Eng.Sc. Bannu, S.Si., M.Si
Language	Indonesian Language
Relation to Curriculum	Undergraduate degree program, mandatory, 5rd semester
Type of Teaching, Contact Hours	**Teaching methods**: [group discussion], [~~simulation~~], [case study], [~~collaborative learning~~], [~~project-based learning~~], [problem-based learning]. **Teaching forms**: [lecture], [~~tutorial~~], [~~seminar~~], [~~practicum~~], [~~research~~], [~~internship~~], [~~community service~~] **Schedule**: Wednesday, 09.10 – 11.50
Workload	For this course, students are required to meet a minimum of 136.00 hours in one semester, which consist of: - 40.00 hours for lecture, - 48.00 hours for structured assignments, - 48.00 hours for private study
Credit Points	3 Credit Points (equivalent with 5.1 ECTS)
Requirements According to the Examination Regulations	A student must have attended at least 80% of the lectures to sit on the final examination.
Mandatory Prerequisites	-
Module objectives/intended learning outcomes	**Intended Learning Outcomes (ILO):** ● ILO 1: Students have relatively deep understood in classical and basic quantum physics. ● ILO 2: Students are able to use the fundamental principles of physics in modeling and computation to solve the complex physical problem. ● ILO 3: Students are able to use the basic principles of physics in technology application. ● ILO 4 : Students have capability to operate the physical instrumentation in the laboratory and conduct experiments and interpret the result.

	Course Learning Objective (CLO): After completing this course, students will be able to explain the division of the Electromagnetic Wave Spectrum, formulate electromagnetic wave equations and their solutions in the context of dielectric and conductor media, as well as their application in reflection and refraction processes. They will apply the physical properties of Optics through processes like Polarization, Interference, and Diffraction, including an examination of far-field diffraction (Fraunhofer Diffraction) and near-field diffraction (Fresnel Diffraction). Additionally, they will analyze and process wave spectra in the context of Fourier Optics, Scattering theory, and nonlinear optics.. **Sub CLO** ILO 1 ⇒ CLO 1: Able to explain the concepts and fundamental principles of optical physics in the context of classical optics and modern optics, including properties of coherence and monochromaticity. ILO 2 ⇒ CLO 2: Describes the division of the electromagnetic wave spectrum, starting from invisible light such as gamma rays, X-rays, ultraviolet rays, infrared rays, radio waves, up to radar waves. Further explains the visible light spectrum, covering the colors violet, blue, green, yellow, orange, and red. Can elucidate the sources of electromagnetic waves generated by light-emitting processes, including atomic translation, rotation, and vibration, resulting in electromagnetic wave spectra. ILO 3 ⇒ CLO 3: Able to apply solutions for electromagnetic wave behavior in reflection and refraction processes, including formulating Snell's Law, Fresnel equations, and the Brewster angle. ILO 4 ⇒ CLO 4: Applies the physical properties of Optics through processes like Polarization, encompassing linear, circular, and elliptical polarization. Explores Interference and coherence processes, diffraction with multiple slits, and examines far-field diffraction (Fraunhofer Diffraction) and near-field diffraction (Fresnel Diffraction). ILO 5 ⇒ CLO 5: Capable of analyzing and processing electromagnetic wave spectra using Fourier optics for periodic wave

Content	Students will learn about: 1. Description of the electromagnetic wave spectrum 2. Solution of electromagnetic wave equation 3. Utilization of solutions to the electromagnetic wave equation and overview of reflection and refraction processes 4. Solution of the electromagnetic wave polarization equation for cases of linear, circular, and elliptical polarizations 5. Review of electromagnetic wave equations in interference processes with two beams, parallel plate interference, and study of Fraunhofer diffraction (far field) and Fresnel diffraction (near field) processes 6. Analysis of electromagnetic wave spectrum in the Fourier optics perspective and Fourier transformation 7. Overview of scattering and Nonlinear Optics.
Forms of Assessment	Assessment techniques: [written test], [observation], [~~participation~~], [~~performance~~], [~~oral test~~] Assessment forms: [quiz], [final term exam], [report] Final term exam = 25%, Quiz = 35%, Report= 25%, Assignment: 15% CLO-1 => ILO 1 Assignment 1 (15 %) CLO-2 => ILO 2: Quiz 1 (5 %) CLO-2 => ILO 3: Quiz 2 (5 %) CLO-3 => ILO 3: Quiz 3 (5 %) CLO-3 => ILO 3: Quiz 4 (10 %) CLO-3=> ILO 3: Quiz 5 (10 %) CLO-3 => ILO 3: Exam (25 %) CLO-4 => ILO 4: Report (25 %)
Study and examination requirements and forms of examination	**Study and examination requirements:** - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Media Employed	Text book, Video and Power Point Presentation.

	2. Teori ddan soal OptikSchaum's Outline Series Theori and Problems of Optics, Agus D Djamhoer, dkk, ARMICO, Bandung. 3. Lipson, Stephen G. (1995). Optical Physics (3rd ed.). Cambridge University Press. ISBN 0-5214-3631-1. 4. Born, Max;Wolf, Emil. Principles of Optics (7th ed.). Pergamon Press, 1999.