Module Handbook

Module name	Statistical Physics
Module level, if applicable	Bachelor of Science
Code, if applicable	18H02121503
Subtitle, if applicable	-
Course, if applicable	-
Semester(s) in which the module is taught	4th (Even)
Person responsible for the module	Prof. Dr. Tasrief Surungan, M.Sc
Lecturer	Prof. Dr. Tasrief Surungan, M.Sc., Prof. Dr. Paulus Lobo Gareso, M.Sc.
Language	Indonesian Language [Bahasa Indonesia]
Relation to Curriculum	This course is a mandatory course and is offered in the 4th 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~~] CH : 08.00 - 16.00
Workload	For this course, students are required to meet a minimum of 136 hours in one semester, which consists of: - 40 hours for lectures, - 48 hours for structured assignments, - 48 hours for private study
Credit points	3 credit points (equivalent to 5.1 ECTS)
Requirements according to the examination regulations	Students have participated in at least 80% of the learning activities (Academic Regulations, Chapter VII)
Recommended prerequisites	Basic Physics 2 and Thermodynamics
Module objectives/intended learning outcomes	After completing this module: **Intended Learning Outcomes** ● **ILO 2**: Students will be able to use the fundamental principles of physics in modeling and computation to solve the complex physical problem. ● **ILO 3**: Students will be able to use the basic principles of physics in technology application.

	Course Learning Objectives: Students are expected to be able to outline the concepts and principles of statistical mechanics/physics in deriving thermodynamic formulas related to thermodynamic quantities such as energy, entropy, and thermodynamic functions of the system under consideration. **Sub-CLO:** **ILO 2 ⇒ CLO 1:** Students are able to explain the concepts of macroscopic-microscopic variables and functions, forms of system-environment interactions, entropy, kinetic theory of gasses, thermal properties of materials, transport phenomena, and statistical mechanics. **ILO 3 ⇒ CLO 2:** Students are able to elaborate logically and critically on examples and solutions related to interactions within thermodynamic systems and applying thermodynamic laws in everyday life. **ILO 2 ⇒ CLO 3:** Students are able to demonstrate measurable performance concerning experimental examples of thermodynamic phenomena, applying laws and thermal properties of materials independently or in groups. **ILO 2 ⇒ CLO 4:** Students are able to analyze mathematical models in gas equations of state, thermodynamic law equations, thermodynamic machine efficiency equations, work and energy functions, entropy functions, and thermodynamic potential functions based on forms of state change processes. **ILO 3 ⇒ CLO 5:** Students are able to internalize academic values, norms, and ethics in the learning process during each meeting, as well as in presentations and discussions related to thermodynamic problems or phenomena, including the second law of thermodynamics, thermodynamic machine efficiency, entropy concept, and thermal properties of materials.
Content	Students will learn about: 1. Phase Space and Canonical Systems 2. Kinetic Theory of Gases 3. Ising Model and Monte Carlo Method
Forms of Assessment	Assessment techniques: [observation], [participation], [~~performance~~], [written test], [~~oral test~~] Assessment forms: [~~quiz~~], [midterm exam], [final term exam], [assignment], [~~report~~], [presentation] Assignment = 15%, Presentation = 25%, Mid exam = 30%; Final exam = 30% CLO 1 => ILO 2: 20% (Midterm exam: written test) CLO 2 => ILO 3: 15% (Midterm exam: written test, Assignment: participation) CLO 3 => ILO 2: 10% (Assignment: participation) CLO 4 => ILO 2: 30% (Final exam: written test) CLO 5 => ILO 3: 25% (Presentation: observation)

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 the final grade. **Form of examination:** Written Exam
Media employed	LED, Whiteboard, Textbook, Learning Management System (SIKOLA)
Reading list	**Main**: 1. Zemansky MW & Dittman RH, Heat and Thermodynamics, 7th ed., McGraw-Hill, New york, 1997. 2. Nainggolan WS, Termodinamika: Teori dan Soal Penyelesaian, Armico, Bandung, 1992. 3. Abbott MM & Van Ness HC, Seri Buku Schaum: Teori dan Soal-soal Termodinamika, edisi kedua, terjemahan Darmadi Kusno dkk, Penerbit Erlangga, Jakarta, 1994. 4. Welty JR, Wicks CE, Wilson RE & Rorrer G, Fundamentals of Momentum, Heat and Mass Transfer, edisi ke 4, terjemahan Gunawan Prasetio dengan judul Dasar-Dasar Fenomena Transport, Penerbit Erlangga, Jakarta, 2004. 5. Jeans S.J, An Introduction to the Kinetic Theory of Gases, Cambrige, University Press, 1967.