Statistical physics

Module Name :	Statistical physics	
Module Level :	Undergraduate	
Code :	32256043	
Sub-heading, if applicable :		
Classes, if applicable :		
Semester :	7th	
Module coordinator :	Dr. Anggara Budi Susila, M.Si.	
Lecturer(s) :	Dr. Anggara Budi Susila, M.Si. Dr. Hadi Nasbey, S.Pd., M.Si	
Language :	Indonesian	
Classification within the curriculum :	Compulsory course	
Type of Teaching	Contact hours per week during the semester	Class Size
Lecture (Expository, discussion, exercise)	150 minutes	40
Workload	Total workload of this course 136 hours (4.5 ECTS) per semester which consist of 40 hours (1.32 ECTS) classroom activity, 48 hours (1.59 ECTS) structured task, and 48 hours (1.59 ECTS) per semester.	
Credit points :	4,5 ECTS	
Prerequisite course(s) :	-	
Course Outcomes :	After taking this course the student have ability to : CLO144. Students have an understanding of binomial and polynomial systems, probability distributions discrete and continuous, Poisson and Gauss equations, micro states, macro states, Maxwell-Boltzmann distribution, Bose-Einstein distribution, Fermi-Dirac distribution. Maxwell-Boltzmann distribution, Bose-Einstein distribution, Fermi-Dirac distribution.Able to examine the concepts and theories of thermodynamics.	
Content :	1. Distribution function and probability • Discrete Distribution Function • Discrete distribution function of binomial form • Discrete distribution function of polynomial form • Continuous distribution function • Probability of discrete distribution function • Probability of continuous distribution function • Poisson equation • Gauss equation 2. Thermodynamic coordinates and thermodynamic potential • Thermodynamic coordinates • Thermodynamic potential	

	• Gibbs paradox differential equation • Differential equation of enthalpy • Inner energy differential equation • Helmholtz energy function differential equation 3. Gas Kinetics Theory • Particle flux • Rate relationship with pressure and temperature • Deviations from the ideal nature of the equation of state: ✓ According to Clausius According to Van der Walls 4. Velocity and rate distribution of gas particles • Rate and velocity distribution according to Maxwell • Rate and velocity distribution according to MaxwellBoltzmann • Energy distribution • Energy equipartition principle • Thermal capacity at fixed volume • Thermal capacity at fixed pressure • Laplace's constant 5. Transport phenomenon • Collision cross section • Mean free path • Viscosity coefficient • Diffusion coefficient • Transport equation 6. Maxwell-Boltzmann statistics • Macro and micro states in the system • Maxwell-Boltzmann particle distribution • Partition function • Entropy and Helmholtz function in view of statistical mechanics 7. Bose-Einstein statistics (Bozon) • Bose-Einstein distribution • Blackbody radiance • Wien's shift law • Stefan-Boltzmann law 8. Fermi-Dirac statistics (fermions) • Fermi-Dirac distribution • Electrons in solids • Canonical ensemble • Microcanonical ensemble and its limitations • Canonical ensembles and non-ideal gases
Study/exam achievements:	Examination are conducted as unit test, as following

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<tr><th>No</th><th>Assesment Object</th><th>Assesment Technique</th><th>Weight</th></tr>
<tr><td>1</td><td>Assignment/Quizzes/Project</td><td>Written Test</td><td>20%</td></tr>
<tr><td>2</td><td>Midterm Test</td><td>Written Test</td><td>40%</td></tr>
<tr><td>3</td><td>Final Test</td><td>Written Test</td><td>40%</td></tr>
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<tr><td>Media :</td><td>Laptop/Computer, Epsilon (Study Program E-Learning), University LMS, Projector, Video Conference Software: Zoom Meeting, Reference Book</td></tr>
<tr><td>Literatures :</td><td>

A.J. Pointon, An Introduction to Statistical Physics, Longman 1967.
F.W. Sears & G.L. Salinger, Thermodinamics Kinetic Theory and Statistical Thermodinamics, Addison Welley, New York, 1975
F. Reif, Fundamentals of Statistical and Thermal Physics, McGraw-Hill, Inc, 1985
A. Mikrajuddin, Fisika Statistik untuk Mahasiswa MIPA, Diktat Kuliah ITB, 2009.
M.G.V. Rosser, An Introduction to Statistical Physics, Chicester Brisbane, Toronto, New York, Elis Horwood Publisher.

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