MINISTRY OF EDUCATION AND CULTURE
UNIVERSITAS NEGERI SURABAYA
FACULTY OF MATHEMATICS AND NATURAL SCIENCES
DEPARTMENT OF PHYSICS
Ketintang Campus, Jalan Ketintang, C3 Building, Surabaya 60231
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Undergraduate Programme of Physics Education **Module Handbook**

Module Name :	*Fisika Statistik* Statistical Physics
Module level :	Bachelor degree/Undergraduate Programme
Course Code :	8420302247
Abbreviation, if applicable:	-
Courses included in the module, if applicable:	Not Applicable
Semester/Term	5/Third Year
Module coordinator(s)	
Lecturer(s):	Tjipto Prastowo, Ph.D. Utama Alan Deta, M.Pd., M.Si.
Language:	*Bahasa Indonesia*
Classification within the curriculum:	Compulsory/ ~~Elective~~
Teaching format/class hours per week during the semester:	2 contact hours of lectures (Indonesia credit semester or sks*)
Workload :	2 x 50 minutes lectures, 2 x 60 minutes structured activity, 2 x 60 minutes individual activity, 14 weeks per semester, 90 total hours per semester ~ 3.18 ECTS**
Credit Point:	2 sks (3.18 ECTS)
Requirements:	Modern Physics
Learning goals/competencies:	1. Demonstrating independent, creative and honest characters in doing student assignments, mid and final exams 2. Understanding theoretical concepts of Statistical Physics in general and Classical Statistics (Maxwell-Boltzmann distribution) and Quantum Statistics (Bose-Einstein and Fermi-Dirac distributions) comprehensively 3. Being able to formulate problem solving for procedural problems relevant to the applications of both Classical and Quantum Statistics to some statistical phenomena found in microscopic systems.
Content	Statistical Physics examines the behaviour of microscopic systems having extremely huge number of constituting particles through an approach of both classical distribution of Maxwell-Boltzmann Statistics and quantum distribution of Bose-Einstein and Fermi-Dirac Statistics. During class discussion, differences among the three statistical distribution are explained. The applications of the classical and quantum statistical distribution are discusssed that include ideal and real gases, boson and fermion gases, classical and semi-classical gases, Gibbs paradox,

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<tr><td></td><td>entropy of classical and semi-classical gases, monoatomic and diatomic gases, the specific heat of monoatomic and diatomic gases, the specific heat of solids based on classical and quantum calculations, and total partition function in the presence of molecular interaction, and the introduction of concepts of micro canonical, canonical and grand canonical ensembles.</td></tr>
<tr><td>Attribute Soft skill:</td><td>Scientific report, public speaking, and team work</td></tr>
<tr><td>Study/exam achievements:</td><td>Students are considered to complete the course and pass if they obtain at least 40% of maximum final grade. The final grade (NA) is calculated based on the following ratio:
<table>
<tr><th>Assessment Components</th><th>Percentage of contribution</th></tr>
<tr><td>Participation</td><td>20%</td></tr>
<tr><td>Assignment</td><td>30%</td></tr>
<tr><td>Mid-semester test</td><td>20%</td></tr>
<tr><td>Final semester test</td><td>30%</td></tr>
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<tr><td>Learning Methods :</td><td>Student-centered approach, lecture and discussion, and presentations (structured activities)</td></tr>
<tr><td>Form of Media:</td><td>Power Point slides, e-book file, and multimedia.</td></tr>
<tr><td>Literature (primary references):</td><td>1. Prastowo, T. 2014. Lecture Notes on Statistical Physics. Unpublished work.
2. Pointon, A. J. 1978. An Introduction to Statistical Physics. London, UK: Longmann.
3. Beiser, A. 1988. Perspective of Modern Physics. London, UK: McGraw-Hill.
4. Serway, R. A. et al. 2005. Modern Physics. California, US: Thomson Learning Inc.
5. Kittel, C. and H. Kroemer. 1980. Thermal Physics. New York, US: W. H. Freeman and Co
6. Some power point files and/or course materials relevant to Statistical Physics from the internet</td></tr>
<tr><td rowspan="2">Notes:</td><td>*1 sks in learning process = three periods consist of: (a) scheduled instruction in a classroom or laboratory (50 minutes); (b) structured activity (60 minutes); and (c) individual activity (60 minutes) according to the Regulation of Indonesia Ministry of Research, Technology, and Higher Education No. 44 Year 2015 jo. the Regulation of Indonesia Ministry of Research, Technology, and Higher Education No. 50 Year 2018.</td></tr>
<tr><td>**1 sks = 1,59 ECTS according to Rector Decree Of Universitas Negeri Surabaya No. 598/Un38/Hk/Ak/2019</td></tr>
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