



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  
Website: <http://s1-fisika.fmipa.unesa.ac.id/>, email: [s1-fisika@unesa.ac.id](mailto:s1-fisika@unesa.ac.id)

Undergraduate Programme In Physics

Module Handbook

Module Name :	<i>Termodinamika Bahan</i> Thermodynamics Of Material
Module level :	Bachelor degree/Undergraduate Programme
Course Code :	4520103210
Abbreviation, if applicable:	-
Courses included in the module, if applicable:	Not Applicable
Semester/Term	5/Third Year
Module coordinator(s)	Dr. ZA Imam Supardi, M.Si
Lecturer(s):	Diah Hari Kusumawati, M.Si Lydia Rohmawati, M.Si
Language:	<i>Bahasa Indonesia</i>
Classification within the curriculum:	Compulsory/ <del>Elective</del>
Teaching format/class hours per week during the semester:	2 contact hours of lectures (Indonesia credit semester or sks*)
Workload :	a. Lecture: 1 x 50 minutes lectures, 1 x 60 minutes structured activity, 1 x 60 minutes individual activity, 14 weeks per semester, 39.67 total hours of lecture per semester ~ 1.59 ECTS b. Lab activity: 1x170 minutes lab activity, 14 weeks per semester 39.67 total hours of lab activity per semester ~ 1.59 ECTS Total of lecture and lab activity= 79.33 total hours per semester ~ 3.18 ECTS**
Credit Point:	2 sks (3.18 ECTS)
Requirements:	Materials Science



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Learning goals/competencies:	<ol style="list-style-type: none"> <li>1. understand theoretical concepts in the field of physics knowledge in general and theoretical concepts in particular the diffusion process, diagrams phase, transformations phase in a depth, and can formulate procedural problem solving</li> <li>2. Implement higher an order thinking processes (critical, creative, logical, and problem solving) in studying diffusion processes, diagrams phase, transformations phase both inductively and deductively</li> <li>3. Using symbolic and numerical language creatively in describing the process of diffusion and change qualitatively and quantitatively phase</li> <li>4. Utilizing information and communication technology for the benefit of strengthening and disseminating scientific products of physics by searching relevant journals that discuss diffusion processes, diagrams phase and transformations phase (ICT literacy and Technology Skills)</li> <li>5. Understand the material, structure, and concepts of physics and their application in technology</li> </ol>										
Content	<p>Analysis of the mechanism of diffusion, Fick's Law I and 2, Factors affecting Diffusion. Diagram Phase Analysis, Solubility limits, microstructure, balance phase, Interpretation of Diagrams Phase. Analysis of Transformation Phase, Kinetic Energy in transformations phase, Isothermal transformation diagrams, and continuous transformation diagrams. Learning is carried out using the discussion method and related journal searches.</p>										
Attribute Soft skill:	Scientific report, public speaking, and team work										
Study/exam achievements:	<p>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:</p> <table border="1"> <thead> <tr> <th>Assessment Components</th><th>Percentage contribution of</th></tr> </thead> <tbody> <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> </tbody> </table>	Assessment Components	Percentage contribution of	Participation	20%	Assignment	30%	Mid-semester test	20%	Final semester test	30%
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Learning Methods :	<ol style="list-style-type: none"> <li>1. Student-centered approach,</li> <li>2. Lecture and discussion,</li> <li>3. Laboratorium activity</li> <li>4. Presentations</li> </ol>
Form of Media:	<i>Power Point</i> slides, e-book file, and multimedia.
Literature references): (primary	<ol style="list-style-type: none"> <li>1. Callister, Jr.D William, 2009, "Materials Science And Engineering" , 8-th, John Willey &amp; Sons, Inc</li> <li>2. Diah Hari Kusumawati, Lydia Rohmawati, 2019, "Buku Ajar Termodinamika Bahan", JDS.</li> <li>3. Benjamin Crowell, 2009, " Simple Nature: An Introduction to Physics for Engineering and Physical Science Student", <a href="http://www.lightandmatter.com">www.lightandmatter.com</a>.</li> <li>4. National and international journals or course materials relevant from the internet</li> </ol>
Notes:	<p>*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.</p>
	<p>**1 sks = 1,59 ECTS according to Rector Decree Of Universitas Negeri Surabaya No. 598/Un38/Hk/Ak/2019</p>