Undergraduate Programme in Science Education **Module Handbook**

Module Name:	*Zat dan Energy* (Matter and Energy)
Module Level:	Bachelor degree/Undergraduate Programme
Course Code:	8420103158
Abbreviation, if applicable:	ZE
Courses included in the module, if applicable:	Not applicable
Semester/term	III/second year (sophomore)
Module coordinator(s):	Tutut Nurita, S.Pd., M.Pd.
Lecturer(s):	Tutut Nurita, S.Pd., M.Pd. Muhamad Arif Mahdiannur, S.Pd., M.Pd. Ernita Vika Aulia, S.Pd., M.Pd.
Language:	*Bahasa Indonesia* (Indonesian Language)
Classification within the curriculum:	Compulsory / ~~Elective~~
Teaching format/class hours per week during the semester:	3 contact hours of lectures (Indonesia credit semester or *sks**)
Workload:	3 x 50 minutes lectures, 3 x 60 minutes structured activity, 3 x 60 minutes individual activity, 14 weeks per semester, 119 total hours per semester ~ 4.77 ECTS**
Credit point:	3 *sks* (4.77 ECTS)
Requirements:	-
Learning goals/competencies:	**Course Learning Outcomes (CLOs):** After taking this course, students will be able to: 1. Ability to make a decision based on information and data analysis and able to give direction and to choose alternative solutions; 2. Ability to mastery the theoretical concepts of matter and energy and able to formulate it to solve problem procedurally; 3. Ability to utilize science and technology instruments in the field of matter and energy and ability to adapt toward current facing problem related to solving a problem; 4. Ability to identify the state of matter (solid, liquid, and gas), analyze phase diagram (phases of matter and transitions), analyze the state of matter change process, describe temperature and heat, and identify form of energy that happens in everyday life; 5. Ability to identify and to analyze the expansion of matter, describe the thermodynamics concepts and analyses it in everyday life phenomena, describe mechanical energy due to conservation of energy, solve a problem that related to the conservation of mechanical energy, describe the conservation law in

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<tr><td></td><td>energy and its application on simple machine's mechanical advantages;
6. Ability to demonstrate responsibility in their conduct and behavior in the classroom and scientific investigation, especially on delivering the information.</td></tr>
<tr><td>Content:</td><td>State of matter; Phases diagram (phases of matter and transitions); Temperature and heat; Form of energy; History of energy concept; Conservation of energy; Mechanical energy; Simple machine; and Thermodynamics.</td></tr>
<tr><td>Attribute Soft skill:</td><td>Discipline, collaboration, responsibility, and argumentation in the natural classroom setting</td></tr>
<tr><td>Study/exam achievements:</td><td>Students are considered to be competent and pass if at least get 40% of the maximum final grade. The final grade (NA) is calculated based on the following weight:

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<tr><th>Assessment Components</th><th>Percentage 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>
<tr><td>Total</td><td>100%</td></tr>
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<tr><td>Learning Methods</td><td>Student-centered approach, deductive learning, lecturing, discussion, and presentation (structured activities), and flip learning</td></tr>
<tr><td>Form of Media:</td><td>LCD, PowerPoint, hand out, simulation, and e-learning Vinesa (https://vinesa.unesa.ac.id/course/view.php?id=374)</td></tr>
<tr><td>Literature (primary references):</td><td>1. National Research Council. (2004). Advanced Energetic Materials. National Academies Press.
2. National Research Council. (2004). Materials count: The Case for Material Flows Analysis. National Academies Press.
3. Horton, P., McCarthy, T., Werwa, E., & Zike, D. (2005). Physical Science: K. The Nature of Matter. Glencoe/McGraw-Hill.
4. Silberberg, M. (2018). Chemistry: The Molecular Nature of Matter and Change with Advanced Topics. McGraw-Hill.
5. Giambattista, A., McCarthy Richardson, B., & Richardson, R. C. (2010). Physics (2nd ed.). McGraw-Hill.
6. Moran, M. J., Shapiro, H. N., Boettner, D. D., & Bailey, M. B. (2011). Fundamentals of Engineering Thermodynamics (7th ed.). John Wiley & Sons.</td></tr>
<tr><td>Notes:</td><td>*1 sks in learning process = three contact hours that 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</td></tr>
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	2015 jo. the Regulation of Indonesia Ministry of Research, Technology, and Higher Education No. 50 Year 2018.
	****1 sks = 1,59 ECTS**