Module Descriptions

A **module** is a self-contained **learning unit** within a higher education program that includes thematically related courses and is assigned a **fixed number of credits**. It follows specific **learning objectives**, includes an **assessment component**, and contributes to achieving the qualifications of a degree program. In some countries, “modules” are also named “courses”.

Please provide a module description for each module. In addition to the compulsory and elective modules, this also includes credited internships and the final thesis.

Please summarize all module descriptions in one document (Module Handbook) and create a table of contents so that the modules can be found easily.

Module designation	*Chemical Equilibrium*
Semester(s) in which the module is taught	2nd
Person responsible for the module	*1. Prof. Dr. Dra. Isana Supiah YL. M.Si.* *2. Prof. Dr. Dra. Isana Supiah YL. M.Si.* *3. Yunilia Nur Pratiwi*
Language	*Bahasa Indonesia*
Relation to curriculum	*Compulsory / ~~elective / specialisation~~*
Teaching methods	*Lecture, discussion, project*
Workload (incl. contact hours, self-study hours)	Total workload of the activity is 91 hours for theory and 91 hours for practical work per semester for 16 weeks which consist of: *100 minutes/week for class learning* *120 minutes/week for structured activities* *120 minutes/week for individual study* *170 minutes/week for laboratory work*
Credit points	*3 SKS (4.8 ECTS)*
Required and recommended prerequisites for joining the module	*Creativity, innovation, and entrepreneurship*

<table>
<tr><td>Module objectives/intended learning outcomes</td><td>On successful completion of the course students should be able to:
1. Students are able to demonstrate honesty and responsibility in conducting laboratory practices based on applicable ethics and regulations.
2. Students are able to analyze concepts of gases and their properties, the first law of thermodynamics and its applications, the second and third laws of thermodynamics and their applications, as well as the physical properties of solutions.
3. Students are able to construct systematic arguments in reporting the results of problem-solving related to chemical equilibrium in a critical manner.
4. Students are able to carry out laboratory activities to verify chemical equilibrium concepts collaboratively.</td></tr>
<tr><td>Content</td><td>Concepts of gases and their properties, the first law of thermodynamics and its applications, thermochemistry, the second and third laws of thermodynamics and their applications, chemical equilibrium, phase equilibrium, physical properties of solutions, and electrochemical equilibrium.</td></tr>
<tr><td>Examination forms</td><td>Project report and presentation, written tests</td></tr>
<tr><td>Study and examination requirements</td><td>Minimum attendance at lectures is 75%
Final score (NA) is calculated as follows:
<table>
<tr><td>Learning Outcome</td><td>Weight (%)</td><td>Technique of Assesment</td></tr>
<tr><td>1,2</td><td>5</td><td>Participation</td></tr>
<tr><td>3</td><td>20</td><td>Task</td></tr>
<tr><td>1-3</td><td>10</td><td>Mid-term Written Test</td></tr>
<tr><td>1-3</td><td>10</td><td>Final Term</td></tr>
<tr><td>4</td><td>20</td><td>Case Study</td></tr>
<tr><td>4</td><td>35</td><td>Team Based Project</td></tr>
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Reading list	1. Ijang Rohman dan Sri Mulyani. (2000). Kimia Fisika I. Bandung: IMSTEP JICA 2. Louis Jacob Bircher. (1942). Physical Chemistry, A Brief Course with Laboratory Experiments. New York: Prentice-Hall Inc 3. Howard DeVoe. (2015). Thermodynamics and Chemistry. New York: Prentice-Hall Inc 4. David Ronis. (2015). Introductory Physical Chemistry I. Canada: McGill University 5. Peter Atkins and Julio de Paula. (2006). Physical Chemistry. New York: W. H. Freeman and Company. 6. P.K. Nak. (2006). Basic and Applied of Thermodynamics. India: Tata McGraw-Hill 7. Michael J. Moran, Howard N. Shapiro, Daisie D. Boettner, Margaret B. Bailey. (2014). Fundamentals of Engineering Thermodynamics.New York: John Wiley & Sons, Inc. 8. W. J. Moore. Physical Chemistry. Btoomington: Prentice-Hall, Inc. 9. Ira N. Levine. (2009). Physical Chemistry. New York: The McGraw-Hill Companies, Inc 10. R. K. Rajput. (2007). Engineering Thermodynamics. New Delhi: LAXMI PUBLICATIONS (P) LTD

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