

Module Descriptions

Module designation	Thermodynamics of Chemistry
Semester(s) in which the module is taught	3rd/second year
Person responsible for the module	Dr. Dian Novita ST., M.Pd
Language	Bahasa Indonesia (Regular Class) Bahasa Inggris (Internasional Class)
Relation to curriculum	Compulsory course
Teaching methods	Project-Based Learning 3 workhours per week (3 x 170 minutes per week)
Workload (incl. contact hours, self-study hours)	1 CU for a bachelor's degree equals 170 minutes (50 minutes face-to-face, 60 minutes structured, 60 minutes independent learning) per week × 14 weeks, excluding mid and end-term exams. = 39.67 work hours per semester = 1.587 ECTS.
Credit points	3 Credits Units (CU) = (4.77 ECTS)
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	<ol style="list-style-type: none"> 1. Understand the fundamental principles of thermodynamics and their applications: properties and behavior of gases; gas kinetics; energy, heat, and work; internal energy and enthalpy; direction of processes and the concept of entropy; free energy and its relation to system stability, chemical equilibrium, thermodynamics of electrochemical cells, solution thermodynamics, and phase equilibrium. 2. Solve science-and-technology problems in chemistry within common/simple contexts by applying knowledge of gas properties and behavior; gas kinetics; energy, heat, and work; internal energy and enthalpy; process direction and entropy; free energy and its relation to system stability, chemical equilibrium, thermodynamics of electrochemical cells, solution thermodynamics, and phase equilibrium. 3. Demonstrate the ability to use learning resources and ICT-based media to understand concepts in energetics/thermodynamics. 4. Make decisions linking basic chemical concepts with laboratory activities, research findings, and the presence of chemistry in everyday life. 5. Show a responsible attitude toward work in one's area of expertise and carry it out independently.

Content	A study of the properties and behaviour of gases; gas kinetics; energy, heat, and work; internal energy and enthalpy; process direction and the concept of entropy; free energy and its relationship to system stability; chemical equilibrium; thermodynamics of electrochemical cells; solution thermodynamics; phase equilibrium; and appropriate laboratory activities.
Examination forms	Essay and Oral Presentation
Study and examination requirements	<p>Study and Examination Requirements/Assessment:</p> <ol style="list-style-type: none"> 1. Individual assignments 2. Documentation and presentation of assignments 3. Group discussions 4. Laboratory works <p>Assessment Recap (Case Study-Oriented):</p> <ol style="list-style-type: none"> 5. Participatory Activities/Case Study Analysis: 60% 6. Practical Assessment: 10% 7. Test: 30%% <p>Total: 100%</p>
Reading list	<ol style="list-style-type: none"> 1. Atkins, S.P.W. and Paula, J. d. 2018. Physical Chemistry, 11th edition. New York: Oxford University Press. 2. David W. Ball, Physical Chemistry, 2nd Edition. Stamford: Cengage Learning. 3. Levine, Ira N. 2014. Quantum chemistry, 7th edition. New York: Pearson Education, Inc. 4. Mortimer, R.G. 2008, Physical Chemistry, 3th edition, London: Elsevier Inc