UNIVERSITAS NEGERI YOGYAKARTA
FACULTY OF MATHEMATICS AND NATURAL SCIENCES
DEPARTMENT OF CHEMISTRY EDUCATION
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Bachelor of Education in Chemistry **MODULE HANDBOOK**

Module name:	**Chemical Equilibrium**
Module level, if applicable:	Undergraduate
Code:	KIM 6405
Sub-heading, if applicable:	-
Classes, if applicable:	2
Semester:	3rd
Module coordinator:	Dr. Isana Supiah Yosephine Louise, M.Si
Lecturer(s):	**Dr. Isana Supiah Yosephine Louise, M.Si.; Prof. Dr. Endang Widjajanti L. FX, M.S.**; Marfuatun, S.Pd.Si.,M.Si.
Language:	Bahasa Indonesia and English
Classification within the curriculum:	Compulsory Course
Teaching format / class hours per week during the semester:	200 minutes lectures, 240 minutes structured activities, and 240 minutes individual study
Workload:	Total workload is 181.34 hours per semester which consists of 200 minutes lectures, 240 minutes structured activities, and 240 minutes individual study per week for 16 weeks.
Credit points:	4 SKS (6.57 ETCS)
Prerequisites course(s):	-
Course outcomes:	After taking this course, the students are expected to be able to: CO1. understand gas and its properties, the first law of thermodynamics and its applications, the second and third laws of thermodynamics and their applications, the physical properties of solutions CO2. be able to apply the first law of thermodynamics in thermochemistry, thermodynamic law in chemical equilibrium, thermodynamic law in phase balance, thermodynamic law in electrode balance
Content:	Chemical Equilibrium subjects discuss the concept of gas and its properties, the first law of thermodynamics and its application, thermochemistry, the second and third laws of thermodynamics and their application, chemical balance, phase balance, physical properties of solutions, and electrochemical balance. Learning Materials: 1. Gas and its properties 2. The First Law of Termodinamiaka 3. Thermochemistry 4. Second and Third Laws of the Law of Thermodynamics 5. Chemical Balance 6. Phase Balance 7.Properties of Solution Physics

<table>
<tr><td></td><td>8. Electrode balance</td></tr>
<tr><td>Study / exam achievements:</td><td>Attitude assessment is carried out at each meeting by observation and/or self-assessment techniques using the assumption that basically every student has a good attitude. The student is marked very good or not good attitude if they show it significantly compared to other students in general. The result of attitude assessment is not taken into account in the final grades, but as one of the requirements to pass the course. Students will pass from this course if at least have a good attitude.
The final mark will be weight as follow:
<table><tr><th>No</th><th>CO</th><th>Assessment Object</th><th>Assessment Technique</th><th>Weight</th></tr><tr><td>1</td><td>CO1,
CO2,</td><td>Assignments
Laboratory activities (include : pretest, report, posttest, laboratory skill)
Class activities
Mid-term Semester
Final Exam</td><td>Presentation / written test</td><td>20%
30%

10 %
25%
25%</td></tr><tr><td colspan="4">Total</td><td>100%</td></tr></table></td></tr>
<tr><td>Forms of media:</td><td>Laboratory work materials and equipment, Board, LCD Projector, Laptop/Computer, Module</td></tr>
<tr><td>References:</td><td>Howard DeVoe. (2015). Thermodynamics and Chemistry. New York: Prentice-Hall Inc.
David Ronis. (2015). Introductory Physical Chemistry I. Canada: McGill University
Ijang Rohman dan Sri Mulyani. (2000). Kimia Fisika I. Bandung: IMSTEP JICA
Louis Jacob Bircher. (1942). Physical Chemistry, A Brief Course with Laboratory Experiments. New York: Prentice-Hall Inc
Wolfgang Schaertl, (2014). Basic Physical Chemistry: A Complete Introduction of Bachelor on Science Level. 1st edition. Germany: Deloitte & Touche
Johannes Gernert, Andreas Jäger, Roland Span. (2014).Calculation of phase equilibria for multi-component mixtures usinghighly accurate Helmholtz energy equations of state. Fluid Phase Equilibria, 375 (2014) 209–218.
Georgios Tsaparlis (2016). The logical and psychological structure of physical chemistry and its relevance to graduate students' opinions about the difficulties of the major areas of the subject. Chem. Educ. Res.Pract., 17, 320-336. doi.org/10.1039/C5RP00203F
Georgios Tsaparlis (2014). The logical and psychological structure of physical chemistry and its relevance to the organization/sequencing of the major areas covered in physical chemistry textbooks. Chem. Educ. Res.Pract., 15, 391-401. doi.org/10.1039/C4RP00019F</td></tr>
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PLO and CO mapping

	PLO					
	Attitude		Knowledge	Specific Skill	General Skill	
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CO1			√			
CO2				√		√