Diponegoro University
Faculty of Science and Mathematics
Undergraduate Program Of Chemistry

Module designation	**Chemical Speciation**
Semester(s) in which the module is taught	6
Person responsible for the module	Dr.Muhammad Cholid Djunaidi, S.Si., M.Si. Nor Basid Adiwibawa Prasetya, S.Si., M.Sc., Ph.D.
Language	Indonesian
Relation to curriculum	~~Compulsory /~~ elective ~~/ specialisation~~
Teaching methods	Lecture
Workload (incl. contact hours, self-study hours)	Face to face : 1 x (2 x 50 min); Structured study: 1 x (2 x 60 min); Self study: 1 x (2 x 60 min)
Credit points	2
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	1. Demonstrate a responsible attitude towards work in their field of expertise independently (S9) 2. Mastering the theoretical concepts of structure, properties, changes, kinetics, and energetics of molecules and chemical systems, identification, separation, characterization, transformation, synthesis of macromolecular chemicals, and their application. (PP1) 3. Mastering the basic principles of software for analysis, synthesis, and molecular modeling in general or more specific chemical fields. (PP3) 4. Able to apply logical, critical, systematic, and innovative thinking in the development or implementation of science and technology that pays attention to and uses humanities values by their field of expertise. (KU1) 5. Able to analyze several alternative solutions in identification, analysis, isolation, transformation, and synthesis of available chemicals and present analysis conclusions for appropriate decision making. (KK3)

Content	1. Chemical speciation based on theory, function and definition 2. The concept of metal and non-metal speciation 3. Instrumentation theory concept of separation 4. Applications of gas chromatography (GC) and high performance liquid chromatography (HPLC) in chemical speciation 5. Applications of membranes in chemical speciation 6. Arsenic and chrome speciation 7. Selenium and mercury speciation 8. Speciation of iron and copper according to the Pourbaix diagram 9. Study of speciation using electrophoresis: the case of arsenic and selenium 10. Study of speciation using polarography: the case of tin 11. Cadmium and copper speciation 12. Specific studies using ion-selective electrodes: the case of cadmium and copper 13. Speciation studies using X-ray spectroscopy 14. Internal and external calibration techniques in speciation
Exams and assessment formats	Mid-Semester Exam and Final Exam
Study and examination requirements	Participatory Activities 20% Project Results 30% Task 10% Quiz 10% Mid-semester 15% Final exams 15%
Reading list	1. Kriz, PL,. Introduction to Organic Laboratory Technique 2. Sudjadi, 1990, Metode Pemisahan 3. Khopkar, 1990, Kimia Analitik Dasar 4. Mulder, M, 1996, Basic Principle of Membrane Technology, Kluwer Academic Publisher 5. Skoog, 1997, Principle of Instrumental Analytical 6. Bartsch, Way, 1996, Chemical Separations with Liquid Membranes, C.S. Symposium Series 7. Kot, A., Namiesnik, J. 2000, The role of speciation in analytical chemistry, Trends in Analytical Chemistry, 19, 69-79 8. Cornelis, R, 2003, Handbook of elemental speciation: techniques and methodology, John Willey & Sons Ltd, England.