Module Descriptions

Module designation	**Spectroscopy and Chromatography method**
Semester(s) in which the module is taught	3rd/Second Year
Person responsible for the module	Dr. Indah Ardiningsih
Language	Bahasa Indonesia (Regular Class) Bahasa Inggris (Internasional Class)
Relation to curriculum	Compulsory course
Teaching methods	Case method 3 workhours per week or 170 minutes
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 Credit Units (CU) = 4,761 ECTS
Required and recommended prerequisites for joining the module	Basic Chemistry
Module objectives/intended learning outcomes	1. Explain the basics and principles of spectroscopy and chromatography, including UV-Visible spectroscopy, atomic absorption spectroscopy, infrared spectroscopy, and spectrofluorometry; 2. Carry out separation techniques using chromatography and spectroscopy methods appropriate to the characteristics of the samples being analyzed; and 3. Apply spectroscopy and chromatography methods to analyze samples and interpret the results of the analysis effectively. These objectives aim to develop students' theoretical understanding, practical skills, and analytical capabilities in instrumental chemical

Content	1. Introduction to spectrometric, spectrophotometric, and chromatographic analysis methods 2. UV-Vis spectrometry analysis method 3. Atomic Absorption Spectrophotometry (AAS) analysis method 4. Chromatography principles and apparatus components 5. Types of chromatography and their characteristics 6. Chromatographic separation techniques and analysis 7. Application of chromatography in qualitative and quantitative analysis 8. Chromatographic parameter concepts and operational skills development 9. Principles of Nuclear Magnetic Resonance (NMR) 10. NMR spectroscopy analysis parameters and interpretation 11. Infrared (IR) spectroscopy principles and instrument components 12. IR spectra interpretation and practical applications 13. Mass Spectrometry (MS) fundamentals and combined analysis methods
Examination forms	Essay and Oral Presentation
Study and examination requirements	Individuals assignment, group assignment, discussion, presentation, and practicum. Assessment Recap (Project-Based Learning): - Participatory Activities: 57.5% - Project/Product Assessment: 10% - Practice/Performance: 12.5% - Test : 20% - Total: 100%
Reading list	1. David Harvey, 2023, Modern Analytical Chemistry, McGraw-Hill Higher Education 2. Ardiningsih, et al .2021. Iron speciation in Fram Strait and over the northeast Greenland shelf: An inter-comparison study of voltammetric methods. Frontiers in Marine Science, https://doi.org/10.3389/fmars.2020.609379