Diponegoro University
Faculty of Science and Mathematics
Undergraduate Program Of Chemistry

Module designation	**Analytical Chemical Research Engineering (TPKA)**
Semester(s) in which the module is taught	6
Person responsible for the module	Didik Setiyo W., S.Si., M.Si., Dr. Retno Ariadi L., M.Si
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	KAI2

Module objectives/intended learning outcomes	1. Demonstrate a responsible attitude towards work in their field of expertise independently (S9) 2. Able to apply logical, critical, systematic, and innovative thinking in the context of the development or implementation of science and technology that pays attention to and uses humanities values by their field of expertise (KU1) 3. Able to demonstrate independent, quality, and measurable performance (KU2) 4. Able to make decisions regularly in the context of solving problems in their area of expertise, based on the results of information and data analysis (KU5) 5. Able to solve science and technology problems in general and straightforward chemical fields such as identification, analysis, isolation, transformation, and synthesis of micromolecules through the application of knowledge of structure, properties, kinetics, and energetics of molecules and chemical systems, with analytical and synthesis methods in the field-specific chemistry, as well as the application of relevant technology (KK2) 6. Mastering the theoretical concepts of structure, properties, changes, kinetics, and energetics of molecules and chemical systems, identification, separation, characterization, transformation, synthesis of micromolecular chemicals and their application (PP1) 7. Students can apply (C3) how to prepare solutions for implementation (P2) for various purposes and have the readiness to organize (A4 and P5) technical strategies before starting research (thesis), especially in chemical analysis purposes.
Content	1. Lecture Contract and Introduction to research techniques in analytical chemistry (spectrometry, electrometry, membranes, adsorption, and other fields) 2. Stoichiometric calculations in how to prepare solutions as needed 3. Dissolution and dilution 4. Analytical techniques with calibration curves and standard addition 5. Spectrometric measurement techniques: Basic techniques 6. UV-Vis Spectrometry technique 7. Atomic Absorption Spectrophotometry technique 8. Electrochemical experimental technique 9. Techniques for managing and evaluating electrochemical data 10. Membrane-based experimental technique 11. analysis and developing variable in membrane-based research 12. adsorption-based experimental technique 13. analysis and developing variable in adsorption-based research 14. Other method research techniques and manipulating the intricacies of experimentation

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. Skoog, D.A. 1985, Principles of Instrumental Analysis, edisi ke-3, Saunders College Pub., Philadelphia 2. Hashwell, S.J.(editor), 1991, Atomic Absorption Spectrometry: Theory, Design and Applicatio , Elsevier, Amsterdam