Diponegoro University
Faculty of Science and Mathematics
Undergraduate Program Of Chemistry

Module designation	**Instrumental Analytical Chemistry 2 (KAI 2)**
Semester(s) in which the module is taught	5
Person responsible for the module	Drs. Abdul Haris, M.Si., Didik Setiyo W., S.Si., M.Si., Gunawan, M.Si., 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	KAI1

Module objectives/intended learning outcomes	(S9) Demonstrate a responsible attitude towards work in their area of expertise independently (PP2) Mastering complete operational knowledge about functions and analysis of data and information from classical and modern (instrumental) measurement results (KU1) 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 (KU2) Able to demonstrate independent, quality, and measurable performance (KU7) Able to be responsible for the achievement of group work results and supervise and evaluate the completion of work assigned to workers under their responsibility (KK3) Able to conduct research that includes identification, formulation, and analysis of engineering problems on processes and equipment needed to convert raw materials into products with added value

Content	1. Lecture contract, Introduction to electrochemical chemistry: Cell components, Cell potential, Current relationship in electrochemical cells, Effect of concentration on cell potential 2. Cell potential calculation: Electrode potential, Standard electrode potential 3. Cell potential calculation from electrode potential Cell potential calculation: Cell thermodynamic potential, Liquid junction potential, Ohmic potential (IR drop) 4. Basics of Potentiometry: Reference electrode, Metal indicator electrode 5. Potentiometry Fundamentals: Membrane indicator electrodes and task discussion (1) 6. Potentiometric Analysis: Instruments for measuring cell potential and discussion of tasks (2) 7. Potentiometric Analysis: Potentiometric titration and task discussion (3) 8. Coulometry- Amperometry: Controlled potential coulometry, Controlled current coulometry, Coulometric titration, Amperometric titration 9. Coulometry- Amperometry: Controlled current coulometry, Coulometric titration, Amperometric titration 10. Conductometric analysis: Basic concepts, Conductivity of electrolyte solutions, Electrical double layer 11. Conductometric Analysis: Conductivity Measurement, Conductometric Titration, Applications 12. Polarography and Voltammetry: Ficks's law and Nernst's equation, Polarographic analysis, Polarographic wave equations and discussion of assignments (4) 13. Polarography and Voltammetry: Interpretation of polarographic waves, Diffusion currents and technical factors, Technical aspects of polarographic analysis and task discussion (5) 14. Polarography and Voltammetry: Modified Polarography, Anodic discharge voltammetry and cyclic voltammetry (6)
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. H. Wilard, L.L. Merritt, Jr., J.A. Dean, and F.A. Settle, Jr., “Instrumental Methods of Analysis”, 6th ed., Van Nostrand, Princeton, N.Y., 1981, Chaps.10 and 11 2. G.W. Ewing, “Instrumental Methods of Chemical Analysis”, 4th ed., Mc.Graw-Hill, NewYork, 1975, Chaps. 12 and 13 3. H.H.Baur, G.D.Christian, and J.E. O’Reilly (eds.), “Instrumental Analysis”, Allyn and Bacon, Boston, 1978, Chaps. 12 and 13 4. D.A.Skoog and D.M. West, “Principles of Instrumental Analysis,” 2nd ed., Saunders, Philadelphia, 1980, Chaps. 20,21,22,23 and 24 5. G.D.Christian, “Analytical Chemistry”, 3rd ed., Wiley, New York, 1980, pp 411-413