UNIVERSITAS NEGERI YOGYAKARTA
FACULTY OF MATHEMATICS AND NATURAL SCIENCES
DEPARTMENT OF CHEMISTRY
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Module name:	Instrumental Chemistry
Module level,if applicable:	Undergraduate
Code:	KMA6511
Sub-heading,if applicable:	-
Classes,if applicable:	-
Semester:	5th
Module coordinator:	Prof. Dr. Suyanta
Lecturer(s):	1. Prof. Dr. Suyanta, M.Si. 2. Susila Kristianingrum, M.Si 3. Sulistyani, M.Si
Language:	English
Classification within the curriculum:	Compulsory Course
Teaching format / class hours per week during the semester:	• Lectures: 150 minutes lectures, 180 structured activities and 180 individual study per week • Laboratory work: 170 minutes includes the laboratory work and it's reporting per week • Field work: 170 minutes includes it's reporting per week
Workload:	Total workload of the activity is 226,67 hours per semester which consists of 150 minutes lectures, 180 structured activities and 180 individual study, 170 minutes laboratory work with it's reporting, and also 170 minutes field work with it's reporting per week for 16 weeks
Creditpoints:	5 SKS (8 ECTS) includes 3 SKS (5 ECTS) lectures, 1 SKS (2 ECTS) laboratory work, and also 1 SKS (2 ECTS) field work
Prerequisites course(s):	Chemical Separation Method
Course Outcomes	After taking this course, the students have ability to: CO1. Master the concept of the scope of Chemistry Instruments, to master the basic concepts of colorimetric analysis, to master practical assistance material CO2. Understand spectroscopic analysis CO3. Master the basic concepts of UV-Vis spectroscopy analysis, to make calibration curves in analysis with a true UV-VIS spectrophotometer and to do quantitative analysis with a spectrophotometer correctly CO4. Master the basic concepts of FTIR spectroscopy and to interpret the IR spectrum correctly CO5. Master the basic concepts of mass spectroscopy, to explain correctly the ionization technique with MS, and to interpret the mass spectrum correctly CO6. Master the basic concepts of NMR spectroscopy, to

<table>
<tr><td></td><td>explain correctly about NMR instrumentation, to give correctly about examples of NMR applications and to interpret the NMR spectrum correctly
CO7. Master the basic concepts of flame photometry and atomic absorption spectroscopy, to explain correctly about qualitative and quantitative analysis with AAS,to explain correctly about instrumentation, interference that occurs, to give correctly examples of analytical applications with AAS, AES, and AFS, and to calculate elemental levels in a sample from data obtained from measurements with AAS
CO8. Understand and apply the basic concepts of analysis with combined techniques.
CO9. Students are able to use various chemical research strategies and techniques to solve problems and chemical research using a chemical instrumentation (UV-Vis, FTIR, MS, NMR and SSA).
CO10. explain correctly about ICP-MS instrumentation, to explain the application of ICP-MS techniques, to explain correctly the advantages of the ICP-MS combined technique</td></tr>
<tr><td>Content:</td><td>This course discusses about colorimetric methods, UV-Vis Spectroscopy, FTIR Spectroscopy, MS, NMR Spectroscopy, AAS, and combined technique. Lecture emphasizes the mastery of lecture material logically and scientifically and the ability to use scientific methods to solve problems faced by students</td></tr>
<tr><td>Study/exam achievements:</td><td>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 rowspan="7">1</td><td rowspan="7">CO1, CO2, CO3, CO4, CO5, CO6, CO7, CO8, CO9, CO10</td><td>Structural assignment: ability to rasionalize and describing</td><td>Assignment</td><td>15%</td></tr>
<tr><td>Ability to present journal analysis and presentation of results of independent practicum</td><td>Assignment</td><td>15%</td></tr>
<tr><td>Structural assignment: ability to collaborate, analyze, rasionalize, and communicate</td><td>Assignment</td><td>15%</td></tr>
<tr><td>Individual assignment: skill to collect literacy, understanding, and describing</td><td>Assignment</td><td>15%</td></tr>
<tr><td>Mid term exam</td><td>Written test</td><td>20%</td></tr>
<tr><td>Final exam</td><td>Written test</td><td>20%</td></tr>
<tr><td colspan="3">Total</td><td>100%</td></tr>
</table></td></tr>
<tr><td>Forms of media:</td><td>Board, LCD Projector, handouts, PPT slides, and</td></tr>
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	stationaries
References:	A. L. Lorente and Ma Angeles, L.J. (2018). *Foundations of Analytical Chemistry.* 1st ed. e-book, springer. B. J.H. Gross. (2017). *Mass Spectrometry. 3rd ed.* e-book, springer. C. M. Muller et al. (2020). *International Journal of Mass Spectrometry.* 447.116254. D. J.P. Grinias et al. (2016). *J. Chem. Educ*. 93. 1316-1319. E. Kealey, D. and Haine, P.J. (2002). *Analytical Chemistry*. Oxford: BIOS Scientific Publishers Ltd. F. Susila Kristianingrum, Suyanta, dan Siti Sulastri. (2016). *Diktat Kuliah Kimia Analisis Instrumental Bagian Spektroskopi.*Yogyakarta: FMIPA UNY. G. Regina Tutik, dkk. (2010). *Petunjuk Praktikum Kimia Analisis Instrumen*. Yogyakarta: FMIPA UNY. H. Cantle, J.E. (1982). *Atomic Absorption Spectrometry*. New York: Elsevier Sc. I. Skoog, Holler & Nieman. (1998). *Principles of Instrumental Analysis 5ed*. Philadelphia: Saunders College Pub. J. Skoog & West. (1985). *Instrumental Methods of Chemical Analysis*. Philadelphia: Saunders College Pub.

PLO and CO mapping

CO	PLO									
	Attitude	Generic Skills		Knowledge				Specific Skills		
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10
CO1						✓				
CO2						✓				
CO3				✓						
CO4				✓						
CO5				✓						
CO6				✓						
CO7				✓						
CO8										✓
CO9										✓
CO10										✓