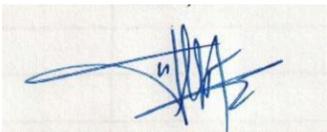


Module Descriptions

Module designation	<i>Chemical Instrumentation</i>
Semester(s) in which the module is taught	5
Person responsible for the module	<i>Dra. Susila Kristianingrum, M.Si.</i>
Language	<i>Indonesia</i>
Relation to curriculum	<i>Compulsory / elective / specialisation</i>
Teaching methods	<i>Lecture, discussion, lab work, project</i>
Workload (incl. contact hours, self-study hours)	<p><i>Total workload of the activity is 136 hours per semester which consist of:</i></p> <p><i>100 minutes/week for class learning</i></p> <p><i>100 minutes/week for activity laboratory</i></p> <p><i>120 minutes/week for structured activities</i></p> <p><i>120 minutes/week for individual study</i></p>
Credit points	<i>3 SKS (4.8 ECTS)</i>
Required and recommended prerequisites for joining the module	<i>Chemical Separation Method</i>
Module objectives/intended learning outcomes	<p><i>On successful completion of the course students should be able to:</i></p> <ol style="list-style-type: none"> <i>1. Demonstrate an independent and responsible attitude in working on structured tasks and independent assignments,</i> <i>2. Describe and explain the basic concepts of various type of chemical instrumentation (Uv-Vis, FTIR, MS, NMR, AAS, AES) ,</i> <i>3. Make calibration curves in analysis with a true UV-VIS spectrophotometer, AAS and to do quantitative analysis with a spectrophotometer correctly,</i> <i>4. Analyze and discuss data from practical work and make conclusion</i> <i>5. explain the basic concepts of mass spectroscopy, to explain correctly the ionization technique with MS, and to interpret the mass spectrum correctly,</i> <i>6. explain the basic concepts of NMR spectroscopy, to explain correctly about NMR instrumentation, to give correctly about examples of NMR applications and to interpret the NMR spectrum correctly,</i> <i>7. Explain correctly about qualitative and quantitative analysis with AAS, about instrumentation, interference that occurs, to give correctly examples of analytical applications with AAS, AES,</i> <i>8. Calculate elemental levels in a sample from data obtained from measurements with AAS.</i>

Content	<p><i>This course discusses about:</i></p> <ul style="list-style-type: none"> - <i>fundamental concepts of Chemical Instrumentation</i> - <i>colorimetric methods,</i> - <i>Uv-Vis Spectroscopy,</i> - <i>FTIR Spectroscopy,</i> - <i>Mass Spectroscopy,</i> - <i>NMR Spectroscopy,</i> - <i>AAS, and combined technique.</i> 																								
Examination forms	<i>Essay, project, presentation, group discussion, written tests</i>																								
Study and examination requirements	<p><i>Minimum attendance at lectures is 75%. Final score (NA) is calculated as follows:</i></p> <table border="1"> <thead> <tr> <th>Learning Outcome</th> <th>Weight (%)</th> <th>Technique of Assessment</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>5</td> <td>Participation</td> </tr> <tr> <td>2</td> <td>5</td> <td>Quiz</td> </tr> <tr> <td>2,3</td> <td>10</td> <td>Task</td> </tr> <tr> <td>3,4</td> <td>30</td> <td>Lab-work</td> </tr> <tr> <td>5,6</td> <td>20</td> <td>Project and Discussion</td> </tr> <tr> <td>5,6</td> <td>15</td> <td>Mid-term Written Test</td> </tr> <tr> <td>7,8</td> <td>15</td> <td>Final Exam Written Test</td> </tr> </tbody> </table>	Learning Outcome	Weight (%)	Technique of Assessment	1	5	Participation	2	5	Quiz	2,3	10	Task	3,4	30	Lab-work	5,6	20	Project and Discussion	5,6	15	Mid-term Written Test	7,8	15	Final Exam Written Test
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Reading list	<ul style="list-style-type: none"> -Suyanta, Kristianingrum, S., Padmaningrum, R.T., Marwati, S., and Sunarto, 2025, <i>Instrumental Analytical Chemistry (in Indonesia)</i>, Yogyakarta: UNY Press. -Cantle, J.E. 1982. <i>Atomic Absorption Spectrometry</i>. New York : Elsevier -Kealey, D. and Haine, P.J. 2002. <i>Analytical Chemistry</i>. Oxford: BIOS Scientific Publishers Ltd. -Khopkar, S.M. 1990. <i>Basic Concepts of Analytical Chemistry</i> , Jakarta: UI Press. - L. Lorente and Ma Angeles, L.J. (2018). <i>Foundations of Analytical Chemistry</i>. 1st ed. e-book, springer -Pecksock, R.I. & Shield. 1976. <i>Modern Methods of Chemical Analysis</i>. New York: John Wiley & Sons. -Skoog, Holler & Nieman. 1998. <i>Principles of Instrumental Analysis 5^{ed}</i>. Philadelphia: Saunders College Pub. -Skoog & West. 1985. <i>Instrumental Methods of Chemical Analysis</i>. Philadelphia: Saunders College Pub. -Information sources from the internet and journals related to the material 																								

Prepared by	Verified by:	Authorized by:
		
Dra. Susila Kristianingrum, M.Si.		Program Study Coordinator