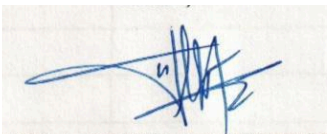
Module Descriptions

Module designation	*Chemical Instrumentation*
Semester(s) in which the module is taught	5
Person responsible for the module	*Dra. Susila Kristianingrum, M.Si.*
Language	*Indonesia*
Relation to curriculum	*Compulsory ~~/ elective~~ / ~~specialisation~~*
Teaching methods	*Lecture, discussion, lab work, project*
Workload (incl. contact hours, self-study hours)	Total workload of the activity is 91 hours for theory and 91 hours for practical work per semester for 16 weeks which consist of*:* *100 minutes/week for class learning* *120 minutes/week for structured activities* *120 minutes/week for individual study* *170 minutes/week for laboratory work*
Credit points	*3 SKS (4.8 ECTS)*
Required and recommended prerequisites for joining the module	*Chemical Separation Method*
Module objectives/intended learning outcomes	*On successful completion of the course students should be able to:* 1. *Demonstrate an independent and responsible attitude in working on structured tasks and independent assignments,* 2. *Describe and explain the basic concepts of various type of chemical instrumentation (Uv-Vis, FTIR, MS, NMR, AAS, AES) ,* 3. *Make calibration curves in analysis with a true UV-VIS spectrophotometer, AAS and to do quantitative analysis with a spectrophotometer correctly,* 4. *Analyze and discuss data from practical work and make conclusion* 5. *explain the basic concepts of mass spectroscopy, to explain correctly the ionization technique with MS,and to interpret the mass spectrum correctly,* 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,* 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,* 8. *Calculate elemental levels in a sample from data obtained from measurements with AAS.*

<table>
<tr><td>Content</td><td>This course discusses about:
- fundamental concepts of Chemical Instrumentation
- colorimetric methods,
-Uv-Vis Spectroscopy,
-FTIR Spectroscopy,
-Mass Spectroscopy,
- NMR Spectroscopy,
-AAS, and combined technique.</td></tr>
<tr><td>Examination forms</td><td>Essay, project, presentation, group discussion, written tests</td></tr>
<tr><td>Study and examination requirements</td><td>Minimum attendance at lectures is 75%. Final score (NA) is calculated as follows:
<table>
<tr><th>Learning Outcome</th><th>Weight (%)</th><th>Technique of Assessment</th></tr>
<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>
</table></td></tr>
<tr><td>Reading list</td><td>-Suyanta, Kristianingrum, S., Padmaningrum, R.T., Marwati, S., and Sunarto, 2025, Instrumental Analytical Chemistry (in Indonesia, Yogyakarta: UNY Press.
-Cantle, J.E. 1982. Atomic Absorption Spectrometry. New York : Elsevier
-Kealey, D. and Haine, P.J. 2002. Analytical Chemistry. Oxford: BIOS Scientific Publishers Ltd.
-Khopkar, S.M. 1990. Basic Concepts of Analytical Chemistry , Jakarta: UI Press.
- L. Lorente and Ma Angeles, L.J. (2018). Foundations of Analytical Chemistry. 1st ed. e-book, springe
-Pecksock, R.I. & Shield. 1976. Modern Methods of Chemical Analysis. New York: John Wiley & Sons.
- Skoog, Holler & Nieman. 1998. Principles of Instrumental Analysis 5^{ed}. Philadelphia: Saunders College Pub.
-Skoog & West. 1985. Instrumental Methods of Chemical Analysis. Philadelphia: Saunders College Pub.
-Information sources from the internet and journals related to the material</td></tr>
<tr><td></td><td></td></tr>
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Prepared by	Verified by:	Authorized by:
		
Dra. Susila Kristianingrum, M.Si.		Program Study Coordinator