



Universitas Negeri Surabaya
Faculty of Mathematics and Natural Sciences
Undergraduate Chemistry Education Study Program

Document
Code

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date																																																																																													
Basics of Analytical Chemistry	8420403287	Compulsory Study Program Subjects	T=3	P=0	ECTS=4.77	3	January 5, 2023																																																																																													
AUTHORIZATION	SP Developer		Course Cluster Coordinator			Study Program Coordinator																																																																																														
	Rusmini S.Pd., M.Si		Prof. Dr. Titik Taufikurohmah, M.Si			Prof. Dr. Utiya Azizah, M.Pd.																																																																																														
Learning model	Case Studies																																																																																																			
Program Learning Outcomes (PLO)	PLO study program which is charged to the course																																																																																																			
	PLO-11	Able to demonstrate knowledge related to theoretical concepts about structure, dynamics and energy, as well as basic principles of separation, analysis, synthesis and characterization of chemicals (CPL 1)																																																																																																		
	Program Objectives (PO)																																																																																																			
	PO - 1	explains the basic principles of analysis which include qualitative and quantitative analysis processes																																																																																																		
	PO - 2	understand cation anion analysis																																																																																																		
	PO - 3	Understand the principles of neutralization, complexing, precipitation and redox titration in calculating the levels of a substance																																																																																																		
	PLO-PO Matrix																																																																																																			
		<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>P.O</th> <th colspan="6">PLO-11</th> </tr> </thead> <tbody> <tr> <td>PO-1</td> <td colspan="6" style="text-align: center;">✓</td> </tr> <tr> <td>PO-2</td> <td colspan="6" style="text-align: center;">✓</td> </tr> <tr> <td>PO-3</td> <td colspan="6" style="text-align: center;">✓</td> </tr> </tbody> </table>						P.O	PLO-11						PO-1	✓						PO-2	✓						PO-3	✓																																																																						
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PO Matrix at the end of each learning stage (Sub-PO)																																																																																																				
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Short Course Description	Study of the basic theory of qualitative and quantitative analysis that supports the process, as well as evaluation of results; qualitative analysis which includes systematic identification of cations and anions; quantitative analysis including gravimetry and volumetry (acid-base, precipitation, complexing, redox). Followed by supporting lab activities. so that students are able to master related concepts, are able to collaborate and be responsible and can communicate their knowledge and skills scientifically																																																																																																			
References	Main :																																																																																																			
	<ol style="list-style-type: none"> Svehla, G, 1979. Vogel's Text Book of Macro and Semimicro Qualitative Inorganic Analysis. Fifth ed. London: Longman Group Limited Day, Jr, R.A., dan Underwood, A.L., 2002. Quantitative Analysis. Sixth Ed. (Alih bahasa: Sopyan, I.). Jakarta: Penerbit Erlangga. Poedjastoeti, S., Monica, M., Sukarmin, dan Rusmini. 2016. Kimia Analisis Kualitatif. Surabaya: Unipress Basset,J.,et.al.1991. Vogel: Texbook of Quantitative Inorganic Analysis Including Elementary Instrumental Analysis. London: Longman Group Limited Briggs, J. G. R. 2000.Chemistry for GCE 'O' Level Practical Workbook. Singapore: Pearson Education Asia Pte Ltd Sawyer, Heineman, and Beebe.1984. Chemistry Experiments for Instrumental Methods. New York: John Wiley & Sons 																																																																																																			
Supporters:																																																																																																				

Supporting lecturer		Prof. Dr. Pirim Setiarso, M.Si. Dr. Maria Monica Sianita Basukiwardojo, M.Si. Prof. Dr. Utiya Azizah, M.Pd. Dr. Sukarmin, M.Pd. Rusmini, S.Pd., M.Si. Prof. Dr. Nita Kusumawati, S.Si., M.Sc. Dr. Indah Ardiningsih, S.Si, M.Sc. Dr. Rosalina Eka Permatasari, M.Pd.					
Week-	Final abilities of each learning stage (Sub-PO)	Evaluation		Help Learning, Learning methods, Student Assignments, [Estimated time]		Learning materials [References]	Assessment Weight (%)
		Indicator	Criteria & Form	Offline (offline)	Online (online)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	Understanding Supporting Theories	asking/answering questions/proposing opinions	Criteria: attached Form of Assessment : Participatory Activities	lecture, discussion, question and answer 150 minutes		Material: principles of qualitative analysis References: Svehla, G, 1979. <i>Vogel's Text Book of Macro and Semimicro Qualitative Inorganic Analysis. Fifth ed. London: Longman Group Limited</i> Material: principles of qualitative analysis References: Poedjiastoeti, S., Monica, M., Sukarmin, and Rusmini. 2016. <i>Qualitative Analytical Chemistry. Surabaya: Unipress</i>	2%
2	Understanding Quantitative Supporting Theory	asking/answering questions/proposing opinions	Criteria: attached Form of Assessment : Participatory Activities	lecture, discussion, question and answer 150 minutes		Material: principles of quantitative analysis References: Day, Jr, RA, and Underwood, AL, 2002. <i>Quantitative Analysis. Sixth Ed. (Translation: Sopyan, I.). Jakarta: Erlangga Publishers.</i> Material: principles of quantitative analysis References: Basset, J., et.al.1991. <i>Vogel: Textbook of Quantitative Inorganic Analysis Including Elementary Instrumental Analysis. London: Longman Group Limited</i>	5%

3	Understand and be skilled in carrying out qualitative and quantitative analysis experimental techniques	asking/answering questions/proposing opinions/rebutting	Criteria: attached Form of Assessment : Participatory Activities	lectures, demonstrations, questions and answers		Material: qualitative experimental techniques References: Sawyer, Heineman, and Beebe. 1984. <i>Chemistry Experiments for Instrumental Methods</i> . New York: John Wiley & Sons <hr/> Material: qualitative experimental techniques References: Svehla, G, 1979. <i>Vogel's Text Book of Macro and Semimicro Qualitative Inorganic Analysis</i> . Fifth ed. London: Longman Group Limited <hr/> Material: quantitative experimental techniques References: Basset, J., et.al.1991. <i>Vogel: Textbook of Quantitative Inorganic Analysis Including Elementary Instrumental Analysis</i> . London: Longman Group Limited	5%
4	Understanding the Systematic Analysis of Cations in General and Group I	asking/answering questions/proposing opinions/rebutting	Criteria: attached Form of Assessment : Participatory Activities	lecture, question and answer		Material: analysis of general and group I cations Reference: Svehla, G, 1979. <i>Vogel's Text Book of Macro and Semimicro Qualitative Inorganic Analysis</i> . Fifth ed. London: Longman Group Limited <hr/> Material: preliminary analysis References: Poedjastoeti, S., Monica, M., Sukarmin, and Rusmini. 2016. <i>Qualitative Analytical Chemistry</i> . Surabaya: Unipress	5%

5	Understanding the Systematics of Cation Analysis in General and Groups II, and III	asking/answering questions/proposing opinions/rebutting	<p>Criteria: attached</p> <p>Form of Assessment : Participatory Activities</p>	lecture, question and answer		<p>Material: analysis of group II and III cations Reference: Svehla, G, 1979. <i>Vogel's Text Book of Macro and Semimicro Qualitative Inorganic Analysis. Fifth ed. London: Longman Group Limited</i></p> <p>Material: analysis of group II and III cations References: Poedjiastoeti, S., Monica, M., Sukarmin, and Rusmini. 2016. <i>Qualitative Analytical Chemistry. Surabaya: Unipress</i></p>	5%
6	Understanding the Systematic Analysis of Cations in General and Groups IV and V	asking/answering questions/proposing opinions/rebutting	<p>Criteria: attached</p> <p>Form of Assessment : Participatory Activities, Practical Assessment</p>	lecture, question and answer		<p>Material: analysis of group IV and V cations Reference: Svehla, G, 1979. <i>Vogel's Text Book of Macro and Semimicro Qualitative Inorganic Analysis. Fifth ed. London: Longman Group Limited</i></p> <p>Material: analysis of group IV and V cations References: Poedjiastoeti, S., Monica, M., Sukarmin, and Rusmini. 2016. <i>Qualitative Analytical Chemistry. Surabaya: Unipress</i></p>	5%
7	Understanding Systematic Analysis in General and specifically	asking/answering questions/proposing opinions/rebutting	<p>Criteria: attached</p> <p>Form of Assessment : Participatory Activities, Practical Assessment</p>	lecture, question and answer		<p>Material: anion analysis References: Poedjiastoeti, S., Monica, M., Sukarmin, and Rusmini. 2016. <i>Qualitative Analytical Chemistry. Surabaya: Unipress</i></p>	5%
8	supporting theory and qualitative analysis	writing test	<p>Criteria: attached</p> <p>Form of Assessment : Test</p>	writing test			10%

9	Understand the principles of neutralization titration in calculating the levels of a substance	asking/answering questions/proposing opinions/rebutting	Criteria: attached Form of Assessment : Participatory Activities	lecture, question and answer, discussion 150 minutes		Material: neutralization titration References: Day, Jr, RA, and Underwood, AL, 2002. <i>Quantitative Analysis. Sixth Ed. (Translation: Sopyan, I.). Jakarta: Erlangga Publishers.</i>	5%
10	Understand the principles of neutralization titration in calculating the levels of a substance	asking/answering questions/proposing opinions/rebutting	Criteria: attached Form of Assessment : Participatory Activities, Practical Assessment	lecture, question and answer, discussion 150 minutes		Material: neutralization titration References: Day, Jr, RA, and Underwood, AL, 2002. <i>Quantitative Analysis. Sixth Ed. (Translation: Sopyan, I.). Jakarta: Erlangga Publishers.</i> <hr/> Material: neutralization titration Reference: Basset, J., et.al.1991. Vogel: <i>Textbook of Quantitative Inorganic Analysis Including Elementary Instrumental Analysis. London: Longman Group Limited</i>	10%
11	Understand the principles of precipitation titration in calculating the concentration of a substance	asking/answering questions/proposing opinions/rebutting	Criteria: attached Form of Assessment : Participatory Activities	lecture, question and answer, discussion 150 minutes		Material: precipitation titration References: Day, Jr, RA, and Underwood, AL, 2002. <i>Quantitative Analysis. Sixth Ed. (Translation: Sopyan, I.). Jakarta: Erlangga Publishers.</i> <hr/> Material: precipitation titration Reference: Basset, J., et.al.1991. Vogel: <i>Textbook of Quantitative Inorganic Analysis Including Elementary Instrumental Analysis. London: Longman Group Limited</i>	3%

12	Understand the principles of precipitation titration in calculating the concentration of a substance	asking/answering questions/proposing opinions/rebutting	Criteria: attached Form of Assessment : Participatory Activities, Practical Assessment	lecture, question and answer, discussion 150 minutes		Material: precipitation titration References: Day, Jr, RA, and Underwood, AL, 2002. <i>Quantitative Analysis. Sixth Ed. (Translation: Sopyan, I.).</i> Jakarta: Erlangga Publishers. Material: precipitation titration Reference: Basset, J., et.al.1991. Vogel: <i>Textbook of Quantitative Inorganic Analysis Including Elementary Instrumental Analysis.</i> London: Longman Group Limited	10%
13	Understand the principles of complexing titration in calculating the concentration of a substance	asking/answering questions/proposing opinions/rebutting	Criteria: attached Form of Assessment : Participatory Activities	lecture, question and answer, discussion 150 minutes		Material: complexing titration References: Day, Jr, RA, and Underwood, AL, 2002. <i>Quantitative Analysis. Sixth Ed. (Translation: Sopyan, I.).</i> Jakarta: Erlangga Publishers. Material: complexing titration Reference: Basset, J., et.al.1991. Vogel: <i>Textbook of Quantitative Inorganic Analysis Including Elementary Instrumental Analysis.</i> London: Longman Group Limited	5%
14	Understand the principles of redox titration in calculating the levels of a substance	asking/answering questions/proposing opinions/rebutting	Criteria: attached Form of Assessment : Participatory Activities	lecture, question and answer, discussion 150 minutes		Material: redox titration References: Day, Jr, RA, and Underwood, AL, 2002. <i>Quantitative Analysis. Sixth Ed. (Translation: Sopyan, I.).</i> Jakarta: Erlangga Publishers.	5%

15	Understand the principles of redox titration in calculating the levels of a substance	asking/answering questions/proposing opinions/rebutting	Criteria: attached Form of Assessment : Participatory Activities, Practical Assessment	lecture, question and answer, discussion 150 minutes		Material: redox titration References: <i>Day, Jr, RA, and Underwood, AL, 2002. Quantitative Analysis. Sixth Ed. (Translation: Sopyan, I.). Jakarta: Erlangga Publishers.</i>	10%
16	quantitative analysis	writing test	Criteria: attached Form of Assessment : Test	writing test			10%

Evaluation Percentage Recap: Case Study

No	Evaluation	Percentage
1.	Participatory Activities	60%
2.	Practical Assessment	20%
3.	Test	20%
		100%

Notes

- Learning Outcomes of Study Program Graduates (PLO - Study Program)** are the abilities possessed by each Study Program graduate which are the internalization of attitudes, mastery of knowledge and skills according to the level of their study program obtained through the learning process.
- The PLO imposed on courses** are several learning outcomes of study program graduates (CPL-Study Program) which are used for the formation/development of a course consisting of aspects of attitude, general skills, special skills and knowledge.
- Program Objectives (PO)** are abilities that are specifically described from the PLO assigned to a course, and are specific to the study material or learning materials for that course.
- Subject Sub-PO (Sub-PO)** is a capability that is specifically described from the PO that can be measured or observed and is the final ability that is planned at each learning stage, and is specific to the learning material of the course.
- Indicators for assessing** ability in the process and student learning outcomes are specific and measurable statements that identify the ability or performance of student learning outcomes accompanied by evidence.
- Assessment Criteria** are benchmarks used as a measure or measure of learning achievement in assessments based on predetermined indicators. Assessment criteria are guidelines for assessors so that assessments are consistent and unbiased. Criteria can be quantitative or qualitative.
- Forms of assessment:** test and non-test.
- Forms of learning:** Lecture, Response, Tutorial, Seminar or equivalent, Practicum, Studio Practice, Workshop Practice, Field Practice, Research, Community Service and/or other equivalent forms of learning.
- Learning Methods:** Small Group Discussion, Role-Play & Simulation, Discovery Learning, Self-Directed Learning, Cooperative Learning, Collaborative Learning, Contextual Learning, Project Based Learning, and other equivalent methods.
- Learning materials** are details or descriptions of study materials which can be presented in the form of several main points and sub-topics.
- The assessment weight** is the percentage of assessment of each sub-PO achievement whose size is proportional to the level of difficulty of achieving that sub-PO, and the total is 100%.
- TM=Face to face, PT=Structured assignments, BM=Independent study.