



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																																
SPECTROSCOPIC AND CHROMATOGRAPHIC METHODS	8420402190		T=2	P=1	ECTS=4.77	5	January 4, 2024																																
AUTHORIZATION		SP Developer	Course Cluster Coordinator			Study Program Coordinator																																	
		Rusmini	Prof. Dr. Titik Taufikurohmah, M.Si.			Prof. Dr. Utiya Azizah, M.Pd.																																	
Learning model	Project Based Learning																																						
Program Learning Outcomes (PLO)	PLO study program which is charged to the course																																						
	PLO-9	Mastering the principles of K3 (Work Safety and Security), managing the laboratory and using its equipment as well as how to operate chemical instruments (CPL 3)																																					
	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)																																						
	PLO-PO Matrix																																						
		<table border="1" style="margin: auto;"> <tr> <td style="width: 20%;">P.O</td> <td style="width: 20%;">PLO-9</td> <td style="width: 20%;">PLO-11</td> <td colspan="4"></td> </tr> </table>						P.O	PLO-9	PLO-11																													
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PO Matrix at the end of each learning stage (Sub-PO)																																							
	<table border="1" style="margin: auto;"> <tr> <td rowspan="2" style="width: 10%;">P.O</td> <td colspan="16" style="text-align: center;">Week</td> </tr> <tr> <td style="width: 5%;">1</td> <td style="width: 5%;">2</td> <td style="width: 5%;">3</td> <td style="width: 5%;">4</td> <td style="width: 5%;">5</td> <td style="width: 5%;">6</td> <td style="width: 5%;">7</td> <td style="width: 5%;">8</td> <td style="width: 5%;">9</td> <td style="width: 5%;">10</td> <td style="width: 5%;">11</td> <td style="width: 5%;">12</td> <td style="width: 5%;">13</td> <td style="width: 5%;">14</td> <td style="width: 5%;">15</td> <td style="width: 5%;">16</td> </tr> </table>						P.O	Week																1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16																							
Short Course Description	Study of chemical analysis qualitatively and quantitatively in terms of chemical structure, energetics and analysis based on the working principles of several Spectrophotometer and Chromatography instruments accompanied by supporting laboratory activities so that students are able to master related concepts, are skilled in using tools, are able to collaborate and be responsible and can communicate knowledge and scientific skills																																						
References	Main :																																						
	<ol style="list-style-type: none"> 1. Ewing G.W, 1981, Instrumental Methods Of Chemical Analysis, International Student Edition, Tokyo: McGraw-Hill Kogakusha Ltd 2. Harvey,D. 2000. Modern Analytical Chemistry. Int. Ed. Singapore: Mc.Graw 3. Hill Sawyer, Heineman, and Beebe,1984, Chemistry Experiments for Instrumental Methods , New York : John Wiley & Sons 4. Skoog, D.A,1980, Principles Of Instrumental Analysis, ed II, Tokyo: Holt- Sounders Japan 																																						
	Supporters:																																						
Supporting lecturer	Prof. Dr. Pirim Setiarso, M.Si. Dr. Maria Monica Sianita Basukiwardojo, M.Si. Prof. Dr. Titik Taufikurohmah, S.Si., M.Si. Rusmini, S.Pd., M.Si. Prof. Dr. Nita Kusumawati, S.Si., M.Sc. Dr. Indah Ardinarsih, S.Si, M.Sc.																																						
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	1.spectrometric analysis method 2.UV Vis spectrophotometry	asking/answering questions/proposing opinions/rebutting	Criteria: attached Form of Assessment : Participatory Activities	lectures, discussions, questions and answers		Material: UV Vis Reader: Harvey,D. 2000. <i>Modern Analytical Chemistry. Int. Ed. Singapore: Mc. Graw</i> Material: UV Vis Bibliography: Ewing GW, 1981, <i>Instrumental Methods Of Chemical Analysis, International Student Edition, Tokyo: McGraw-Hill Kogakusha Ltd</i>	5%
2	1.UV Vis spectrophotometry 2.counting with lambert beer	asking/answering questions/proposing opinions/rebutting	Criteria: attached Form of Assessment : Participatory Activities	lectures, discussions, questions and answers		Material: UV Vis Reader: Harvey,D. 2000. <i>Modern Analytical Chemistry. Int. Ed. Singapore: Mc. Graw</i> Material: analysis with UV Vis Bibliography: Ewing GW, 1981, <i>Instrumental Methods Of Chemical Analysis, International Student Edition, Tokyo: McGraw-Hill Kogakusha Ltd</i>	5%
3	AAS	asking/answering questions/proposing opinions/rebutting	Criteria: attached Form of Assessment : Participatory Activities	lecture, question and answer, discussion		Material: AAS Reference: Ewing GW, 1981, <i>Instrumental Methods Of Chemical Analysis, International Student Edition, Tokyo: McGraw-Hill Kogakusha Ltd</i> Material: AAS Reader: Harvey, D. 2000. <i>Modern Analytical Chemistry. Int. Ed. Singapore: Mc. Graw</i>	3%
4	AAS	asking/answering questions/proposing opinions/rebutting	Criteria: attached Form of Assessment : Participatory Activities, Practical Assessment	exercises		Material: AAS Reference: Ewing GW, 1981, <i>Instrumental Methods Of Chemical Analysis, International Student Edition, Tokyo: McGraw-Hill Kogakusha Ltd</i> Material: UV Vis Reader: Harvey,D. 2000. <i>Modern Analytical Chemistry. Int. Ed. Singapore: Mc. Graw</i>	10%

5	Gas Chromatography	asking/answering questions/proposing opinions/rebutting	Criteria: attached Form of Assessment : Participatory Activities	lecture, discussion, question and answer		Material: gas chromatography Reference: Ewing GW, 1981, <i>Instrumental Methods Of Chemical Analysis, International Student Edition, Tokyo: McGraw-Hill Kogakusha Ltd</i>	5%
6	Liquid Chromatography	asking/answering questions/proposing opinions/rebutting	Criteria: attached Form of Assessment : Participatory Activities	lecture, discussion, question and answer		Material: gas chromatography Reference: Ewing GW, 1981, <i>Instrumental Methods Of Chemical Analysis, International Student Edition, Tokyo: McGraw-Hill Kogakusha Ltd</i>	3%
7	chromatography analysis technique	asking/answering questions/proposing opinions/rebutting	Criteria: attached Form of Assessment : Participatory Activities	lectures, discussions, questions and answers		Material: HPLC References: Harvey, D. 2000. <i>Modern Analytical Chemistry. Int. Ed. Singapore: Mc. Graw</i>	5%
8	Meeting materials 1-7	do the UTS answers correctly	Criteria: attached Form of Assessment : Test	writing test		Material: UV VIs, AAS, GC Reference: Harvey,D. 2000. <i>Modern Analytical Chemistry. Int. Ed. Singapore: Mc. Graw</i>	20%
9	IR	asking/answering questions/proposing opinions/rebutting	Criteria: attached Form of Assessment : Participatory Activities	instrumentation		Material: IR Reader: Skoog, DA, 1980, <i>Principles Of Instrumental Analysis, ed II, Tokyo: Holt-Sounders Japan</i>	4%
10	analysis with IR	asking/answering questions/proposing opinions/rebutting	Criteria: attached Form of Assessment : Participatory Activities, Practical Assessment	lectures, questions and answers, practice IR questions		Material: IR analysis Bibliography: Ewing GW, 1981, <i>Instrumental Methods Of Chemical Analysis, International Student Edition, Tokyo: McGraw-Hill Kogakusha Ltd</i>	5%
11	NMR spectrophotometry	asking/answering questions/proposing opinions/rebutting	Criteria: attached Form of Assessment : Participatory Activities	question and answer lecture		Material: NMR Bibliography: Harvey,D. 2000. <i>Modern Analytical Chemistry. Int. Ed. Singapore: Mc. Graw</i>	5%
12	NMR spectrophotometry	asking/answering questions/proposing opinions/rebutting	Criteria: attached Form of Assessment : Participatory Activities	lecture, question and answer practice questions		Material: NMR Bibliography: Harvey,D. 2000. <i>Modern Analytical Chemistry. Int. Ed. Singapore: Mc. Graw</i>	5%

13	1.NMR spectrophotometry 2.draw an NMR spectrum	asking/answering questions/proposing opinions/rebutting	Criteria: attached Form of Assessment : Participatory Activities, Practical Assessment	lecture, question and answer practice questions		Material: NMR Bibliography: <i>Harvey,D. 2000. Modern Analytical Chemistry. Int. Ed. Singapore: Mc. Graw</i>	10%
14	MS spectrophotometry	asking/answering questions/proposing opinions/rebutting	Criteria: attached Form of Assessment : Participatory Activities	lecture, question and answer, discussion		Material: Analysis with MS References: <i>Ewing GW, 1981, Instrumental Methods Of Chemical Analysis, International Student Edition, Tokyo: McGraw-Hill Kogakusha Ltd</i>	0%
15	MS spectrophotometry	asking/answering questions/proposing opinions/rebutting	Criteria: attached Form of Assessment : Participatory Activities	lecture, question and answer, discussion		Material: Analysis with MS References: <i>Ewing GW, 1981, Instrumental Methods Of Chemical Analysis, International Student Edition, Tokyo: McGraw-Hill Kogakusha Ltd</i>	5%
16	UAS		Criteria: attached Form of Assessment : Test	lectures, discussions, questions and answers, practice questions		Material: GC MS Bibliography: <i>Skoog, DA, 1980, Principles Of Instrumental Analysis, ed II, Tokyo: Holt-Sounders Japan</i>	10%

Evaluation Percentage Recap: Project Based Learning

No	Evaluation	Percentage
1.	Participatory Activities	57.5%
2.	Practical Assessment	12.5%
3.	Test	30%
		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.

