					Document Code
	Universitas Negeri Surabaya **Faculty of Mathematics and Natural Sciences** **Undergraduate Chemistry Study Program**				

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date
Analytical Chemistry IV: Met. Spectroscopy & Chromatography	4720102053		T=2	P=0	ECTS=3.18	5	July 18, 2024

AUTHORIZATION	SP Developer	Course Cluster Coordinator	Study Program Coordinator
	....	....	Dr. Amaria, M.Si.

Learning model	**Project Based Learning**

Program Learning Outcomes (PLO)	**PLO study program that is charged to the course**
	Program Objectives (PO)
	PLO-PO Matrix
	P.O
	PO Matrix at the end of each learning stage (Sub-PO)

P.O	Week															
	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 at using instruments, are able to collaborate and be responsible and can communicate their knowledge and skills scientifically.

References	**Main :**	

1. Ewing G.W. 1981. Instrumental Methods Of Chemical Analysis, International Student Edition. Tokyo: McGraw-Hill
2. Kogakusha Ltd Harvey,D. 2000. Modern Analytical Chemistry, Int. Ed. Singapore: Mc.Graw Hill
3. Sawyer, Heineman, and Beebe.1984 . Chemistry Experiments for Instrumental Methods . New York : John Wiley &Sons
4. Skoog, D.A. 1980 . Principles Of Instrumental Analysis, edII, Tokyo: Holt- Sounders Japan
5. Skoog, Douglas.A. 1982, Fundamental of Analytical Chemistry. Fourth Edition. 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. Prof. Dr. Nita Kusumawati, 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	Describe the spectrometry and chromatography analysis methods	1. Explain the spectrometric analysis method. 2. Explain the chromatography method	**Criteria:** Numbers 0 to 100	Lecture, question and answer 2 X 50			0%
2	Describe UV and Vis spectrometry analysis	Can qualitatively and quantitatively analyze compounds in mixtures using UV-Vis spectrometry	**Criteria:** Numbers 0-100	Lecture, question and answer 2 X 50			0%
3	Describe UV and Vis spectrometry analysis	Can qualitatively and quantitatively analyze compounds in mixtures using UV-Vis spectrometry	**Criteria:** Numbers 0 -100	Lecture, question and answer 2 X 50			0%
4	Describe atomic absorption spectrometry analysis	Can quantitatively analyze compounds in mixtures using AAS spectrometry	**Criteria:** Numbers 0-100	Lecture, question and answer 2 X 50			0%
5	Describe atomic absorption spectrometry analysis	Can quantitatively analyze compounds in mixtures using AAS spectrometry	**Criteria:** Numbers 0-100	Question and answer lecture 2 X 50			0%
6	Describe IR spectrometric analysis	Can qualitatively analyze compounds in mixtures using IR spectrometry based on the IR spectrum	**Criteria:** Numbers 0-100	Lecture, question and answer 2 X 50			0%
7	Describe IR spectrometric analysis	Can qualitatively analyze compounds in mixtures using IR spectrometry based on the IR spectrum	**Criteria:** Numbers 0-100	Lecture, question and answer 2 X 50			0%
8	AAS, UV		**Criteria:** Numbers 0-100	2 X 50			0%
9	Describe NMR spectrometry analysis	Can qualitatively analyze compounds in mixtures using NMR spectrometry based on the NMR spectrum	**Criteria:** Numbers 0-100	Lecture, question and answer 2 X 50			0%
10	Describe NMR spectrometry analysis	Can qualitatively analyze compounds in mixtures using NMR spectrometry based on the NMR spectrum	**Criteria:** Numbers 0-100	Lecture, question and answer 2 X 50			0%
11	Describe MS spectrometric analysis	Can qualitatively analyze compounds in mixtures using MS spectrometry based on the MS spectrum	**Criteria:** Numbers 0-100	Lecture, question and answer 2 X 50			0%
12	Describe MS spectrometric analysis	Can qualitatively analyze compounds in mixtures using MS spectrometry based on the MS spectrum	**Criteria:** Numbers 0-100	Lecture, question and answer 2 X 50			0%

13	Describe Chromatography Methods, gas chromatography analysis, high performance liquid chromatography (HPLC) analysis	Can explain the principles of chromatographic analysis	**Criteria:** Numbers 0-100	Lecture, question and answer 2 X 50			0%
14	Describe Chromatography Methods, gas chromatography analysis, high performance liquid chromatography (HPLC) analysis	Can analyze gas chromatography based on chromatograms	**Criteria:** Numbers 0-100	Lecture, question and answer 2 X 50			0%
15	Describe Chromatography Methods, gas chromatography analysis, high performance liquid chromatography (HPLC) analysis	Can analyze high performance liquid chromatography based on chromatograms	**Criteria:** Numbers 0-100	Lecture, question and answer 2 X 50			0%
16	UAS	meeting indicators 9-15	**Criteria:** entrance value of UAS components	2 X 50 test			0%

Evaluation Percentage Recap: Project Based Learning

No	Evaluation	Percentage
		0%

Notes
1. **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.
2. **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.
3. **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.
4. **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.
5. **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.
6. **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.
7. **Forms of assessment:** test and non-test.
8. **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.
9. **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.
10. **Learning materials** are details or descriptions of study materials which can be presented in the form of several main points and sub-topics.
11. **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%.
12. TM=Face to face, PT=Structured assignments, BM=Independent study.