



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

Document Code

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight	SEMESTER	Compilation Date																																																																																			
Applied Analysis	4710203034	Study Program Elective Courses	T=3 P=0 ECTS=6.72	2	July 17, 2024																																																																																			
AUTHORIZATION	SP Developer		Course Cluster Coordinator	Study Program Coordinator																																																																																				
		Dr. Maria Monica Sianita Basukiwardojo, M.Si	Prof. Dr. Nuniek Herdyastuti, M.Si.																																																																																				
Learning model	Case Studies																																																																																							
Program Learning Outcomes (PLO)	PLO study program that is charged to the course																																																																																							
	Program Objectives (PO)																																																																																							
	PO - 1	Able to demonstrate a responsible attitude in applying analytical methods and determining appropriate instruments independently																																																																																						
	PO - 2	Able to make appropriate decisions regarding the methods and instruments used and can process measurement data independently																																																																																						
	PO - 3	Able to create analysis procedures by utilizing various data sources according to process and quality standards																																																																																						
	PLO-PO Matrix																																																																																							
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Short Course Description	Studies in technology, applied chemical analytical methods include measurement, calibration, accuracy and validation of analytical methods created independently																																																																																							
References	Main :																																																																																							
	<ol style="list-style-type: none"> 1. Ewing G. W. 2019. Analytical Instrumentation Handbook. 4th Edition. CRC Press. 2. Skoog, et al. 2016. Principal of Instrumental Analysis. 7th Edition. Boston: Nelson Educaation, Ltd. ISBN: 978-1-305-57721-3 3. Cable, Mike. 2005. Calibration: A Technician's Guide. United States of America. ISA 4. Tarighat, Maryam Abbasi. 2015. Standard Addition Method, Its Modifications and Application. Lambert Academic Publishing 5. Brunelli, Alessandro. 2017. Calibration Handbook of Measuring Instrument. 1st Edition. International Society of Automation. 																																																																																							
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1. Granger, et al. 2017. Instrumental Analysis: Revised Edition. Oxford University Press. ISBN-13: 978-0190865337
2. Harvey, D. 2000. Modern Analytical Chemistry. Int. Ed. Singapore: Mc.Graw Hill.
3. Whittaker, E. T. & Watson, G. N. 2009. A Course of Modern Analysis. 4th Edition. Oxford University Press.

Supporting lecturer
 Prof. Dr. Pirim Setiarso, M.Si.
 Dr. Maria Monica Sianita Basukiwardojo, 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	Calibration course orientation	Can understand the meaning of calibration	Criteria: essays Forms of Assessment : Participatory Activities, Project Results Assessment / Product Assessment, Tests	Lectures and discussions 2 x 50 minutes		Material: General instructions for instrument management and measurement. Reference: <i>Brunelli, Alessandro. 2017. Calibration Handbook of Measuring Instruments. 1st Edition. International Society of Automation.</i>	5%
2	Read data acquisition from the instrument	Can differentiate between data and noise from instrument readings	Criteria: essays Forms of Assessment : Participatory Activities, Project Results Assessment / Product Assessment	Lectures and discussions 2 x 50 minutes		Material: Instrument analysis data in the laboratory Reference: <i>Ewing GW 2019. Analytical Instrumentation Handbook. 4th Edition. CRC Press.</i>	5%
3	Data processing from instruments	Can process data from instrument readings	Criteria: essays Forms of Assessment : Participatory Activities, Project Results Assessment / Product Assessment	Lectures and discussions 2 x 50 minutes		Material: Instrument analysis data in the laboratory Reference: <i>Ewing GW 2019. Analytical Instrumentation Handbook. 4th Edition. CRC Press.</i>	10%
4	Processing data from measurement results	Can understand the standard deviation of data acquisition from instruments	Criteria: Essays Forms of Assessment : Participatory Activities, Project Results Assessment / Product Assessment, Tests	Lectures and discussions 2 x 50 minutes		Material: Basic Measurements References: <i>Skoog, et al. 2016. Principals of Instrumental Analysis. 7th Edition. Boston: Nelson Education, Ltd. ISBN: 978-1-305-57721-3</i>	10%
5	Know the meaning of precision in measurements and be able to distinguish between precise and imprecise data from measurement results and instrument readings	Know the meaning of precision in measurements and be able to distinguish between precise and imprecise data from measurement results and instrument readings	Criteria: essays Forms of Assessment : Participatory Activities, Project Results Assessment / Product Assessment, Tests	Lectures and discussions		Material: Basic Measurements References: <i>Skoog, et al. 2016. Principals of Instrumental Analysis. 7th Edition. Boston: Nelson Education, Ltd. ISBN: 978-1-305-57721-3</i>	10%

6	Know the meaning of accuracy in measurements and be able to distinguish between accurate and inaccurate data from measurement results and instrument readings	Can understand the meaning of accuracy in measurements and be able to distinguish between accurate and inaccurate data from measurement results and instrument readings	Criteria: essays Forms of Assessment : Participatory Activities, Project Results Assessment / Product Assessment	Discussion and lecture 2 x 50 minutes		Material: Basic Measurements References: <i>Skoog, et al. 2016. Principals of Instrumental Analysis. 7th Edition. Boston: Nelson Education, Ltd. ISBN: 978-1-305-57721-3</i>	5%
7	Validate measurement data and instrument readings	Can validate measurement data and instrument readings	Criteria: essays Form of Assessment : Participatory Activities	2 x 50 minute discussions and lectures		Material: Instrument Validation Methods in the Laboratory Library: <i>Ewing GW 2019. Analytical Instrumentation Handbook. 4th Edition. CRC Press.</i>	5%
8	UTS	written exam	Criteria: written exam Form of Assessment : Test	test 2 x 50 minutes			0%
9	Understand calibration applications	Can understand calibration, characteristics and applications	Criteria: essays Form of Assessment : Participatory Activities	lectures and discussions 2 x 50 minutes		Material: Calibration principles include definitions, characteristics, requirements, performance and classification of instruments being calibrated. Reference: <i>Cable, Mike. 2005. Calibration: A Technician's Guide. United States of America. ISA</i>	5%
10	Understand the creation of calibration curves	Able to create a calibration curve	Criteria: essays Forms of Assessment : Participatory Activities, Project Results Assessment / Product Assessment, Portfolio Assessment	lectures and discussions 2 x 50 minutes		Material: Needs and criteria for management and calibration in measuring instruments. Reference: <i>Brunelli, Alessandro. 2017. Calibration Handbook of Measuring Instruments. 1st Edition. International Society of Automation.</i>	5%

11	Know sample measurements with standards	Can carry out sample measurements using a standard curve	Criteria: essays Forms of Assessment : Participatory Activities, Project Results Assessment / Product Assessment	lectures and discussions 2 x 50 minutes		Material: Standard method of addition, modification and application. Reference: <i>Tarighat, Maryam Abbasi. 2015. Standard Addition Method, Its Modifications and Application. Lambert Academic Publishing</i>	10%
12	Know the measurement of samples with addition standards	Can carry out sample measurements using addition standard curves	Criteria: essays Forms of Assessment : Participatory Activities, Project Results Assessment / Product Assessment, Portfolio Assessment	lectures and discussions 2 x 50 minutes		Material: Standard method of addition, modification and application. Reference: <i>Tarighat, Maryam Abbasi. 2015. Standard Addition Method, Its Modifications and Application. Lambert Academic Publishing</i>	10%
13	Create a standard curve with the Excel program	Create a standard curve with the Excel program	Criteria: essays Forms of Assessment : Participatory Activities, Project Results Assessment / Product Assessment	lectures and discussions 2 x 50 minutes		Material: Use of computers in data analysis Reference: <i>Ewing GW 2019. Analytical Instrumentation Handbook. 4th Edition. CRC Press.</i>	5%
14	Creating a standard curve with the originlab program	Can create a standard curve with the originlab program	Criteria: essays Forms of Assessment : Participatory Activities, Project Results Assessment / Product Assessment	lectures and discussions 2 x 50 minutes		Material: Use of computers in data analysis Reference: <i>Ewing GW 2019. Analytical Instrumentation Handbook. 4th Edition. CRC Press.</i>	5%
15	Curve overlay	Can overlay curves	Criteria: essays Forms of Assessment : Participatory Activities, Project Results Assessment / Product Assessment	lectures and discussions 2 x 50 minutes		Material: Use of computers in data analysis Reference: <i>Ewing GW 2019. Analytical Instrumentation Handbook. 4th Edition. CRC Press.</i>	10%
16							0%

Evaluation Percentage Recap: Case Study

No	Evaluation	Percentage
1.	Participatory Activities	48.33%
2.	Project Results Assessment / Product Assessment	38.33%
3.	Portfolio Assessment	5%
4.	Test	8.33%
		99.99%

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.