	Universitas Negeri Surabaya Faculty of Mathematics and Natural Sciences Physics Education Undergraduate Study Program	Document Code

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date
General Chemistry	8420303106		T=3	P=0	ECTS=4.77	1	July 17, 2024

AUTHORIZATION	SP Developer	Course Cluster Coordinator	Study Program Coordinator
	.....	.....	Mita Anggaryani, M.Pd., Ph.D.

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 basic concepts: Scientific Method, Properties of Matter, Stoichiometry, Periodic System of Elements, Chemical Bonds, Energetics, Forms of Substances, Solutions, Colloids, Carbon Chemistry, Green Chemistry and Chemicals in Everyday Life as well as laboratory activities appropriate through discussions, assignments, and practicums
References	**Main :**

1. Tim Kimia Umum. 2013. Kimia Umum . Surabaya: Jurusan Kimia FMIPA Unesa.
2. Brady and Humiston. 2004. General Chemistry, Principles and Structures. 4th. New York: John Willey and Sons.
3. Chang, Raymond. 2005. General Chemistry The Essential Concepts Third Edition. USA: McGraw Hill

Supporters:	
Supporting lecturer	Prof. Dr. Pirim Setiarso, M.Si. Dr. Sukarmin, M.Pd. Dr.Hj. Rinaningsih, S.Pd., M.Pd. Rusly Hidayah, S.Si., M.Pd. Dr. Dina Kartika Maharani, S.Si., M.Sc. Prof. Dr. Nita Kusumawati, S.Si., M.Sc. Samik, S.Si., M.Si. Amalia Putri Purnamasari, S.Si., M.Si. Dr. Moh. Mu'alliful Ilmi, S.Si, M.Si.

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 chemistry as the result of scientific activities that study matter with universal properties	1. Explain the steps of the scientific method 2. Explain the difference between extensive and intensive properties 3. Explain the differences between chemical and physical properties, elements, compounds and mixtures	**Criteria:** 1. The assessment is carried out on the following aspects: 2. Participation during lectures is carried out through observation (weight 2) Mid-Semester Examination (UTS) is carried out by assessing all relevant indicators through a written exam, with a weight of (2) Grades for assignments for working on questions, writing papers and practicums (weight 2) Final Semester Examination (UAS) is carried out by assessing all relevant indicators through a written exam, with the final weight (3) NA being (participation score x2) (assignment score x 3) (UTS score x 2) UAS score (3) divided by 10	Discussion Questions and answers Learning strategy 3 X 50 concept map			0%
2	Understand the things that underlie stoichiometry, namely: basic laws of chemistry, atoms and molecules, the concept of moles and Avogadro's constant, compound formulas, chemical reactions and molarity and equivalence	1. Explain the basic laws of chemistry 2. Explain the differences between atoms, molecules, and the Mole Concept 3. Applying Avogadro's Constant and Compound Formulas 4. Applying Chemical Reactions and Balancing, Molarity and Equivalence in practice questions	**Criteria:** 1. The assessment is carried out on the following aspects: 2. Participation during lectures is carried out through observation (weight 2) Mid-Semester Examination (UTS) is carried out by assessing all relevant indicators through a written exam, with a weight of (2) Grades for assignments for working on questions, writing papers and practicums (weight 2) Final Semester Examination (UAS) is carried out by assessing all relevant indicators through a written exam, with the final weight (3) NA being (participation score x2) (assignment score x 3) (UTS score x 2) UAS score (3) divided by 10	DiscussionTasksLearning strategies concept mapsPracticum 3 X 50			0%

3	Understand the things that underlie stoichiometry, namely: basic laws of chemistry, atoms and molecules, the concept of moles and Avogadro's constant, compound formulas, chemical reactions and molarity and equivalence.	1. Explain the basic laws of chemistry 2. Explain the differences between atoms, molecules, and the Mole Concept 3. Applying Avogadro's Constant and Compound Formulas 4. Applying Chemical Reactions and Balancing, Molarity and Equivalence in practice questions	**Criteria:** 1. The assessment is carried out on the following aspects: 2. Participation during lectures is carried out through observation (weight 2) Mid-Semester Examination (UTS) is carried out by assessing all relevant indicators through a written exam, with a weight of (2) Grades for assignments for working on questions, writing papers and practicums (weight 2) Final Semester Examination (UAS) is carried out by assessing all relevant indicators through a written exam, with the final weight (3) NA being (participation score x2) (assignment score x 3) (UTS score x 2) UAS score (3) divided by 10	DiscussionTasksLearning strategies Practical concept map 3 X 50			0%
4	Understand the development, use and basis of the periodic system and its relationship to the electronic configuration of elements and periodic properties.	1. Explain the development of the Periodic System of Elements and the relationship between electron configurations. 2. Analyze various periodic properties	**Criteria:** 1. The assessment is carried out on the following aspects: 2. Participation during lectures is carried out through observation (weight 2) Mid-Semester Examination (UTS) is carried out by assessing all relevant indicators through a written exam, with a weight of (2) Grades for assignments for working on questions, writing papers and practicums (weight 2) Final Semester Examination (UAS) is carried out by assessing all relevant indicators through a written exam, with the final weight (3) NA being (participation score x2) (assignment score x 3) (UTS score x 2) UAS score (3) divided by 10	DiscussionQuestions and answersAssignment 3 X 50			0%

5	Decide the relationship between chemical bonds and chemical forces to explain knowledge according to the study program.	Explaining the role of electrons in chemical bonds, explaining examples of ionic bonds, covalent bonds, bond energy, molecular structure and other chemical bonds (van.der Waals, hydrogen bonds, metallic bonds)	**Criteria:** 1. The assessment is carried out on the following aspects: 2. Participation during lectures is carried out through observation (weight 2) Mid-Semester Examination (UTS) is carried out by assessing all relevant indicators through a written exam, with a weight of (2) Grades for assignments for working on questions, writing papers and practicums (weight 2) Final Semester Examination (UAS) is carried out by assessing all relevant indicators through a written exam, with the final weight (3) NA being (participation score x2) (assignment score x 3) (UTS score x 2) UAS score (3) divided by 10	Discussion Concept map learning strategies Task 3 X 50			0%
6	Understand the terms, laws of thermodynamics, and determine the occurrence of reactions thermodynamically.	1. Explain the differences between system, environment, state function, adiabatic process, isotherm process, work, heat capacity, etc.). 2. Explaining the First Law of Thermodynamics, Hess's Law, Bond Energy, Thermochemistry, Second Law of Thermodynamics, Entropy, Free Energy.	**Criteria:** 1. The assessment is carried out on the following aspects: 2. Participation during lectures is carried out through observation (weight 2) Mid-Semester Examination (UTS) is carried out by assessing all relevant indicators through a written exam, with a weight of (2) Grades for assignments for working on questions, writing papers and practicums (weight 2) Final Semester Examination (UAS) is carried out by assessing all relevant indicators through a written exam, with the final weight (3) NA being (participation score x2) (assignment score x 3) (UTS score x 2) UAS score (3) divided by 10	Discussions, assignments and practicums. 3 X 50			0%

7	Understand the terms, laws of thermodynamics, and determine the occurrence of reactions thermodynamically.	1. Explain the differences between system, environment, state function, adiabatic process, isotherm process, work, heat capacity, etc.). 2. Explaining the First Law of Thermodynamics, Hess's Law, Bond Energy, Thermochemistry, Second Law of Thermodynamics, Entropy, Free Energy..	**Criteria:** 1. The assessment is carried out on the following aspects: 2. Participation during lectures is carried out through observation (weight 2) Mid-Semester Examination (UTS) is carried out by assessing all relevant indicators through a written exam, with a weight of (2) Grades for assignments for working on questions, writing papers and practicums (weight 2) Final Semester Examination (UAS) is carried out by assessing all relevant indicators through a written exam, with the final weight (3) NA being (participation score x2) (assignment score x 3) (UTS score x 2) UAS score (3) divided by 10	Discussion Practical Assignment 3 X 50			0%
8	UTS	meeting indicators 1-7	**Criteria:** UTS component entry value	2 X 50 test			0%
9	Understand the states of matter in the form of gases and liquids along with the applicable laws and the state of crystalline solids	1. Analyze the properties of gases, liquids and solids 2. Explain crystalline solids 3. Explain changes in state of matter and phase diagrams	**Criteria:** participation value and assignment value	1. Discussion 2. Question and answer 3. Practice questions 3 X 50			0%
10	Understand several aspects of solutions and apply them in quantitative terms	1. Compare the properties of electrolyte and non-electrolyte solutions. 2. Distinguish several colligative properties of solutions. 3. Differentiate acid-base theory 4. Calculate the pH of the solution. 5. Explain hydrolysis and buffer solutions. 6. Determine the pH indicator path. 7. Perform acid-base titration	**Criteria:** participation grades and assignments	1. Discussion 2. Question and answer 3. Practice questions 4. Practicum 3 X 50			0%

11	Understand several aspects of solutions and apply them in quantitative terms.	1. Compare the properties of electrolyte and non-electrolyte solutions. 2. Distinguish several colligative properties of solutions. 3. Differentiate acid-base theory 4. Calculate the pH of the solution. 5. Explain hydrolysis and buffer solutions. 6. Determine the pH indicator path. 7. Perform acid-base titration	**Criteria:** 1. The assessment is carried out on the following aspects: 2. Participation during lectures is carried out through observation (weight 2) Mid-Semester Examination (UTS) is carried out by assessing all relevant indicators through a written exam, with a weight of (2) Grades for assignments for working on questions, writing papers and practicums (weight 2) Final Semester Examination (UAS) is carried out by assessing all relevant indicators through a written exam, with the final weight (3) NA being (participation score x2) (assignment score x 3) (UTS score x 2) UAS score (3) divided by 10	DiscussionQuestions and answersPractice questionsPracticum 3 X 50			0%
12	Understand the principles underlying colloid systems and relate them to everyday symptoms	1. Explain dispersion systems 2. Differentiate types of colloids 3. Differentiate the preparation of colloids 4. Describe the uses of colloids	**Criteria:** participation value and assignment value	1. Discussion 2. Question and answer 3. Practice questions 4. Practicum 2 X 50			0%
13	Understand carbon chemistry, and relate it to everyday life	1. Explain the characteristics of the carbon atom 2. Explain the classification and characteristics of organic compounds 3. Analyze the characteristics of each type of hydrocarbon (saturated, unsaturated, aromatic and substituted)	**Criteria:** participation value	1. Discussion 2. Question and answer 3. Practice questions 3 X 50			0%
14	Understand everyday chemicals so that you can make decisions regarding their relevance to knowledge according to your study program.	1. Analyze the characteristics of household chemicals. 2. Analyze the characteristics of chemicals in food. 3. Explain addictive and psychotropic substances	**Criteria:** participation grades and assignments	presentation, discussion, question and answer 3 X 50			0%

15	Understand everyday chemicals so that you can make decisions regarding their relevance to knowledge according to your study program.	1. Analyze the characteristics of household chemicals. 2. Analyze the characteristics of chemicals in food. 3. Explain addictive and psychotropic substances	**Criteria:** 1. The assessment is carried out on the following aspects: 2. Participation during lectures is carried out through observation (weight 2) Mid-Semester Examination (UTS) is carried out by assessing all relevant indicators through a written exam, with a weight of (2) Grades for assignments for working on questions, writing papers and practicums (weight 2) Final Semester Examination (UAS) is carried out by assessing all relevant indicators through a written exam, with the final weight (3) NA being (participation score x2) (assignment score x 3) (UTS score x 2) UAS score (3) divided by 10	Discussion Questions and answers Practice questions 3 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.