



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

Document Code

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date																																											
Basic chemistry	4720103073		T=3	P=0	ECTS=4.77	1	July 17, 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																																																	
		<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="width: 50px; height: 20px;">P.O</td> <td colspan="16"></td> </tr> </table>						P.O																																										
P.O																																																		
	PO Matrix at the end of each learning stage (Sub-PO)																																																	
	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="width: 50px; height: 20px;">P.O</td> <td colspan="16" style="text-align: center;">Week</td> </tr> <tr> <td></td> <td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td><td>11</td><td>12</td><td>13</td><td>14</td><td>15</td><td>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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Short Course Description	Study of basic concepts: Stoichiometry, Atomic Structure & Periodic System of Elements, Chemical Bonding, Solutions, Colloidal Systems, Energetics, Reaction Rates, Chemical Equilibrium, Redox & Electrochemistry, Organic Chemistry, and Green Chemistry as well as appropriate laboratory activities through discussions, assignments, and practicums.																																																	
References	Main :																																																	
	<ol style="list-style-type: none"> 1. Tim Kimia Dasar. 2017. Kimia Dasar. Surabaya: Unesa University Press. 2. Tim Kimia Umum. 2017. Kimia Umum . Surabaya: Unesa University Press. 3. Tim Kimia Dasar. 2014. Kimia Dasar . Surabaya: Unesa University Press. 4. Brady and Humiston. 2004. General Chemistry, Principles and Structures . New York: John Willey and Sons. 5. Chang, Raymond. 2005. General Chemistry The Essential Concepts Third Edition. USA: McGraw Hill. 																																																	
	Supporters:																																																	
Supporting lecturer	Dr. Amaria, M.Si. Prof. Dr. Suyatno, M.Si. Prof. Dr. Nuniek Herdyastuti, M.Si. Prof. Dr. Sari Edi Cahyaningrum, M.Si. Nur Hayati, S.Si., M.Si. Bertha Yonata, S.Pd., M.Pd. Amalia Putri Purnamasari, S.Si., M.Si. Muhammad Nurrohman Sidiq, S.Si., M.Sc., Ph.D. Herry Wijayanto, S.Pd., M.Sc., D.Sc. dr. Shod Abdurrachman Dzulkarnain, M.Biomed																																																	
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	<p>Apply 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 as well as molarity and equivalence to complete chemical calculations</p>	<p>1. Explain the basic laws of chemistry 2. Explain the differences between Atoms, Molecules and the Mole Concept 3. Apply Avogadro's Constant and Compound Formulas 4. Apply Chemical Reactions and Balancing, Molarity and Equivalence in practice questions 5. Report how to use and operate equipment according to chemistry practicum basics 6. Carrying out chemical separation experiments, Lavoisier's Law and chemical reactions by applying K3 principles</p>	<p>Criteria:</p> <ol style="list-style-type: none"> 1. The assessment is carried out on the following aspects: <ol style="list-style-type: none"> 2.1. Participation during lectures, carried out through observation (weight 2) 3.2. Assignment value for working on questions, writing papers and practical work (weight 3) 4.3. The Mid-Semester Examination (UTS) is carried out by assessing all relevant indicators through a written examination, with a weight of (2) 5.4. The Final Semester Examination (UAS) is carried out by assessing all relevant indicators through a written examination, with a weighting of (3) 6.5. The final NA is (participation value x2) (assignment value x 3) (UTS value x 2) UAS value (3) divided by 10 	<p>Interactive discussions Practice questions Group assignments Practicum 3 X 50</p>			0%
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2	<p>Apply 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 as well as molarity and equivalence to complete chemical calculations</p>	<p>1. Explain the basic laws of chemistry 2. Explain the differences between Atoms, Molecules and the Mole Concept 3. Apply Avogadro's Constant and Compound Formulas 4. Apply Chemical Reactions and Balancing, Molarity and Equivalence in practice questions 5. Report how to use and operate equipment according to chemistry practicum basics 6. Carrying out chemical separation experiments, Lavoisier's Law and chemical reactions by applying K3 principles</p>	<p>Criteria:</p> <ol style="list-style-type: none"> 1. The assessment is carried out on the following aspects: <ol style="list-style-type: none"> 2.1. Participation during lectures, carried out through observation (weight 2) 3.2. Assignment value for working on questions, writing papers and practical work (weight 3) 4.3. The Mid-Semester Examination (UTS) is carried out by assessing all relevant indicators through a written examination, with a weight of (2) 5.4. The Final Semester Examination (UAS) is carried out by assessing all relevant indicators through a written examination, with a weighting of (3) 6.5. The final NA is (participation value x2) (assignment value x 3) (UTS value x 2) UAS value (3) divided by 10 	<p>Interactive discussions Practice questions Group assignments Practicum 3 X 50</p>			0%
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3	Analyze the development of the discovery of the basic atomic particles according to Rutherford, Bohr, wave mechanics and electron configuration as well as the development, use, basis for the preparation of the periodic system and its relationship with the electronic configuration of elements and periodic properties	1. Explain the basic particles that make up atoms 2. Analyze the development of atomic theory 3. Determine the quantum numbers of various atoms 4. Determine the electronic configuration of various atoms 5. Explain the development of the Periodic System of Elements and the relationship between electron configurations. 6. Analyze various periodic properties	Criteria: 1. The assessment is carried out on the following aspects: 2.1. Participation during lectures, carried out through observation (weight 2) 3.2. Assignment value for working on questions, writing papers and practical work (weight 3) 4.3. The Mid-Semester Examination (UTS) is carried out by assessing all relevant indicators through a written examination, with a weight of (2) 5.4. The Final Semester Examination (UAS) is carried out by assessing all relevant indicators through a written examination, with a weighting of (3) 6.5. The final NA is (participation value x2) (assignment value x 3) (UTS value x 2) UAS value (3) divided by 10	Interactive discussions Practice questions Group assignments Presentations Questions and answers 3 X 50			0%
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4	Analyze the development of the discovery of the basic atomic particles according to Rutherford, Bohr, wave mechanics and electron configuration as well as the development, use, basis for the preparation of the periodic system and its relationship with the electronic configuration of elements and periodic properties	1. Explain the basic particles that make up atoms 2. Analyze the development of atomic theory 3. Determine the quantum numbers of various atoms 4. Determine the electronic configuration of various atoms 5. Explain the development of the Periodic System of Elements and the relationship between electron configurations. 6. Analyze various periodic properties	Criteria: 1. The assessment is carried out on the following aspects: 2.1. Participation during lectures, carried out through observation (weight 2) 3.2. Assignment value for working on questions, writing papers and practical work (weight 3) 4.3. The Mid-Semester Examination (UTS) is carried out by assessing all relevant indicators through a written examination, with a weight of (2) 5.4. The Final Semester Examination (UAS) is carried out by assessing all relevant indicators through a written examination, with a weighting of (3) 6.5. The final NA is (participation value x2) (assignment value x 3) (UTS value x 2) UAS value (3) divided by 10	Interactive discussions Practice questions Group assignments Presentations Questions and answers 3 X 50			0%
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5	Identify the relationship between chemical bonds and chemical forces to explain knowledge according to the study program.	<ol style="list-style-type: none"> 1. Determining Ionic Bonds, Covalent Bonds, Bond Energy, and Other Chemical Bonds (van der Waals, Hydrogen Bonds, Metallic Bonds) and their relationship to the properties of substances 2. Describes the resonance structure of a molecule 3. Determining the shape and polarity of a molecule based on the Valence Shell Electron Pair Repulsion Theory or hybridization theory. 4. Determine bond order through orbital energy level diagrams of various diatomic molecules 	<p>Criteria:</p> <ol style="list-style-type: none"> 1. The assessment is carried out on the following aspects: <ol style="list-style-type: none"> 2.1. Participation during lectures, carried out through observation (weight 2) 3.2. Assignment value for working on questions, writing papers and practical work (weight 3) 4.3. The Mid-Semester Examination (UTS) is carried out by assessing all relevant indicators through a written examination, with a weight of (2) 5.4. The Final Semester Examination (UAS) is carried out by assessing all relevant indicators through a written examination, with a weighting of (3) 6.5. The final NA is (participation value x 2) (assignment value x 3) (UTS value x 2) UAS value (3) divided by 10 	Interactive discussion Group Assignment 3 X 50			0%
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6	Analyze several aspects of the solution and apply them in quantitative terms	1. Calculate various solution concentrations. 2. Determine the colligative properties of electrolyte and non-electrolyte solutions. 3. Differentiate acid-base theory 4. Calculate the pH of the solution. 5. Analyze ion equilibrium in salt solutions and relate their pH. 6. Determine working principles, pH calculations and the role of buffer solutions in life. 7. Determine the pH indicator path. 8. Analyze data from various types of acid-base titrations. 9. Conduct acid-base titration experiments	Criteria: 1. The assessment is carried out on the following aspects: 2.1. Participation during lectures, carried out through observation (weight 2) 3.2. Assignment value for working on questions, writing papers and practical work (weight 3) 4.3. The Mid-Semester Examination (UTS) is carried out by assessing all relevant indicators through a written examination, with a weight of (2) 5.4. The Final Semester Examination (UAS) is carried out by assessing all relevant indicators through a written examination, with a weighting of (3) 6.5. The final NA is (participation value x2) (assignment value x 3) (UTS value x 2) UAS value (3) divided by 10	Interactive discussionGroup assignmentPracticum 3 X 50			0%
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7	Analyze several aspects of the solution and apply them in quantitative terms	<p>1. Calculate various solution concentrations. 2. Determine the colligative properties of electrolyte and non-electrolyte solutions. 3. Differentiate acid-base theory 4. Calculate the pH of the solution. 5. Analyze ion equilibrium in salt solutions and relate their pH. 6. Determine working principles, pH calculations and the role of buffer solutions in life. 7. Determine the pH indicator path. 8. Analyze data from various types of acid-base titrations. 9. Conduct acid-base titration experiments</p>	<p>Criteria:</p> <p>1. The assessment is carried out on the following aspects:</p> <p>2.1. Participation during lectures, carried out through observation (weight 2)</p> <p>3.2. Assignment value for working on questions, writing papers and practical work (weight 3)</p> <p>4.3. The Mid-Semester Examination (UTS) is carried out by assessing all relevant indicators through a written examination, with a weight of (2)</p> <p>5.4. The Final Semester Examination (UAS) is carried out by assessing all relevant indicators through a written examination, with a weighting of (3)</p> <p>6.5. The final NA is (participation value x2) (assignment value x 3) (UTS value x 2) UAS value (3) divided by 10</p>	Interactive discussionGroup assignmentPracticum 3 X 50			0%
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8	UTS	Able to solve questions related to meeting material 1 - 7	Criteria: 1. The assessment is carried out on the following aspects: 2.1. Participation during lectures, carried out through observation (weight 2) 3.2. Assignment value for working on questions, writing papers and practical work (weight 3) 4.3. The Mid-Semester Examination (UTS) is carried out by assessing all relevant indicators through a written examination, with a weight of (2) 5.4. The Final Semester Examination (UAS) is carried out by assessing all relevant indicators through a written examination, with a weighting of (3) 6.5. The final NA is (participation value x2) (assignment value x 3) (UTS value x 2) UAS value (3) divided by 10	Written test description 3 X 50		0%
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9	Analyze the principles underlying colloid systems and relate them to everyday symptoms	1. Describe dispersion systems 2. Analyze types of colloids 3. Differentiate the preparation of colloids 4. Describe the uses of colloids	Criteria: 1. The assessment is carried out on the following aspects: 2.1. Participation during lectures, carried out through observation (weight 2) 3.2. Assignment value for working on questions, writing papers and practical work (weight 3) 4.3. The Mid-Semester Examination (UTS) is carried out by assessing all relevant indicators through a written examination, with a weight of (2) 5.4. The Final Semester Examination (UAS) is carried out by assessing all relevant indicators through a written examination, with a weighting of (3) 6.5. The final NA is (participation value x2) (assignment value x 3) (UTS value x 2) UAS value (3) divided by 10	Group assignments Presentation Questions and answers 3 X 50			0%
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10	Describe the terms, laws of thermodynamics, and determine the occurrence of reactions thermodynamically	<p>1. Describe the differences between system, environment, state function, adiabatic process, isotherm process, work, and heat capacity.</p> <p>2. Applying the First Law of Thermodynamics, Hess's Law, and Bond Energy in calculations</p> <p>3. Applying Thermochemical equations, Second Law of Thermodynamics, Entropy, Free Energy in calculations.</p> <p>4. Carrying out thermochemical experiments</p>	<p>Criteria:</p> <p>1. The assessment is carried out on the following aspects:</p> <p>2.1. Participation during lectures, carried out through observation (weight 2)</p> <p>3.2. Assignment value for working on questions, writing papers and practical work (weight 3)</p> <p>4.3. The Mid-Semester Examination (UTS) is carried out by assessing all relevant indicators through a written examination, with a weight of (2)</p> <p>5.4. The Final Semester Examination (UAS) is carried out by assessing all relevant indicators through a written examination, with a weighting of (3)</p> <p>6.5. The final NA is (participation value x2) (assignment value x 3) (UTS value x 2) UAS value (3) divided by 10</p>	Interactive discussionGroup assignmentPracticum 3 X 50			0%
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11	Analyze the concepts underlying the kinetics of a chemical reaction, namely rate, order and reaction mechanism	<ol style="list-style-type: none"> 1.Explain the speed law 2.Explain the factors that influence the rate of a reaction, 3.Explain activation energy, reaction order, collision theory, and chemical reaction mechanisms. 4.Doing experiments 	<p>Criteria:</p> <ol style="list-style-type: none"> 1.The assessment is carried out on the following aspects: <ol style="list-style-type: none"> 2.1. Participation during lectures, carried out through observation (weight 2) 3.2. Assignment value for working on questions, writing papers and practical work (weight 3) 4.3. The Mid-Semester Examination (UTS) is carried out by assessing all relevant indicators through a written examination, with a weight of (2) 5.4. The Final Semester Examination (UAS) is carried out by assessing all relevant indicators through a written examination, with a weighting of (3) 6.5. The final NA is (participation value x2) (assignment value x 3) (UTS value x 2) UAS value (3) divided by 10 	Interactive discussionGroup assignmentPracticum 3 X 50		0%
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12	Describe the laws of chemical equilibrium, Le Chatelier's principle and the use of equilibrium principles in industry	<ol style="list-style-type: none"> 1.Explain how equilibrium reactions occur 2.Lowering the equilibrium constant 3.Explain the relationship between ΔG_o and K_p and K_c 4.Explain the existence of equilibrium disturbances 5.Explain the application of the principle of equilibrium in industry 	<p>Criteria:</p> <ol style="list-style-type: none"> 1.The assessment is carried out on the following aspects: <ol style="list-style-type: none"> 2.1. Participation during lectures, carried out through observation (weight 2) 3.2. Assignment value for working on questions, writing papers and practical work (weight 3) 4.3. The Mid-Semester Examination (UTS) is carried out by assessing all relevant indicators through a written examination, with a weight of (2) 5.4. The Final Semester Examination (UAS) is carried out by assessing all relevant indicators through a written examination, with a weighting of (3) 6.5. The final NA is (participation value x2) (assignment value x 3) (UTS value x 2) UAS value (3) divided by 10 	Interactive discussionGroup assignmentPracticum 3 X 50			0%
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13	Analyze the role of reduction and oxidation in electrochemical events	<ol style="list-style-type: none"> 1. Compare several redox concepts. 2. Explain Galvanic/Voltaic cells 3. Explain electrolysis 4. Predicting the spontaneity of redox reactions 5. Doing practicum 	<p>Criteria:</p> <ol style="list-style-type: none"> 1. The assessment is carried out on the following aspects: <ol style="list-style-type: none"> 2.1. Participation during lectures, carried out through observation (weight 2) 3.2. Assignment value for working on questions, writing papers and practical work (weight 3) 4.3. The Mid-Semester Examination (UTS) is carried out by assessing all relevant indicators through a written examination, with a weight of (2) 5.4. The Final Semester Examination (UAS) is carried out by assessing all relevant indicators through a written examination, with a weighting of (3) 6.5. The final NA is (participation value x2) (assignment value x 3) (UTS value x 2) UAS value (3) divided by 10 	Group assignments Presentation Questions and answers 3 X 50			0%
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14	Describe carbon chemistry and relate it to everyday life	<p>1. Describe the peculiarities of the carbon atom</p> <p>2. Describe the classification and characteristics of organic compounds</p> <p>3. Analyze the characteristics of each type of hydrocarbon (saturated, unsaturated, aromatic and substituted)</p>	<p>Criteria:</p> <p>1. The assessment is carried out on the following aspects:</p> <p>2.1. Participation during lectures, carried out through observation (weight 2)</p> <p>3.2. Assignment value for working on questions, writing papers and practical work (weight 3)</p> <p>4.3. The Mid-Semester Examination (UTS) is carried out by assessing all relevant indicators through a written examination, with a weight of (2)</p> <p>5.4. The Final Semester Examination (UAS) is carried out by assessing all relevant indicators through a written examination, with a weighting of (3)</p> <p>6.5. The final NA is (participation value x 2) (assignment value x 3) (UTS value x 2) UAS value (3) divided by 10</p>	Interactive discussion 3 X 50 group assignments			0%
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15	Analyze the principles that support green chemistry	<p>1.Explain the principles that support green chemistry</p> <p>2.Analyze examples of the application of green chemistry that can be accessed via the internet</p>	<p>Criteria:</p> <p>1.The assessment is carried out on the following aspects:</p> <p>2.1. Participation during lectures, carried out through observation (weight 2)</p> <p>3.2. Assignment value for working on questions, writing papers and practical work (weight 3)</p> <p>4.3. The Mid-Semester Examination (UTS) is carried out by assessing all relevant indicators through a written examination, with a weight of (2)</p> <p>5.4. The Final Semester Examination (UAS) is carried out by assessing all relevant indicators through a written examination, with a weighting of (3)</p> <p>6.5. The final NA is (participation value x2) (assignment value x 3) (UTS value x 2) UAS value (3) divided by 10</p>	Interactive discussion 3 X 50 group assignments			0%
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16	Analyze the principles that support green chemistry	<p>1.Explain the principles that support green chemistry</p> <p>2.Analyze examples of the application of green chemistry that can be accessed via the internet</p>	<p>Criteria:</p> <p>1.The assessment is carried out on the following aspects:</p> <p>2.1. Participation during lectures, carried out through observation (weight 2)</p> <p>3.2. Assignment value for working on questions, writing papers and practical work (weight 3)</p> <p>4.3. The Mid-Semester Examination (UTS) is carried out by assessing all relevant indicators through a written examination, with a weight of (2)</p> <p>5.4. The Final Semester Examination (UAS) is carried out by assessing all relevant indicators through a written examination, with a weighting of (3)</p> <p>6.5. The final NA is (participation value x2) (assignment value x 3) (UTS value x 2) UAS value (3) divided by 10</p>	UAS 3 X 50	UAS		0%
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Evaluation Percentage Recap: Project Based Learning

No	Evaluation	Percentage
		0%

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** abilities in the process and student learning outcomes are specific and measurable statements that identify the abilities 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.

