



**Universitas Negeri Surabaya  
Faculty of Sports and Health Sciences,  
Undergraduate Nutrition Study Program**

Document  
Code

### SEMESTER LEARNING PLAN

<b>Courses</b>	<b>CODE</b>	<b>Course Family</b>	<b>Credit Weight</b>			<b>SEMESTER</b>	<b>Compilation Date</b>																																																																																			
Chemistry	1321102107		T=2	P=0	ECTS=3.18	1	July 18, 2024																																																																																			
<b>AUTHORIZATION</b>	<b>SP Developer</b>		<b>Course Cluster Coordinator</b>			<b>Study Program Coordinator</b>																																																																																				
	Dra. Siti Sulandjari		Dra. Siti Sulandjari			Amalia Ruhana, S.P., M.P.H.																																																																																				
<b>Learning model</b>	Project Based Learning																																																																																									
<b>Program Learning Outcomes (PLO)</b>	<b>PLO study program that is charged to the course</b>																																																																																									
	<b>PLO-8</b>	Able to master the scientific basis of nutrition, food, biomedicine, humanities and public health sciences.																																																																																								
	<b>PLO-9</b>	Able to have an attitude of belief in the Almighty God, be ethical, disciplined, aware of the law, have a social and cultural insight, and behave professionally.																																																																																								
	<b>PLO-11</b>	Able to solve problems in the field of nutrition by applying scientific thinking concepts and cutting-edge approaches through research, scientific literacy and publications.																																																																																								
	<b>Program Objectives (PO)</b>																																																																																									
	<b>PO - 1</b>	Students master the concepts of matter and energy																																																																																								
	<b>PO - 2</b>	Students master measurements in chemical reactions																																																																																								
	<b>PO - 3</b>	Students master the properties and various chemical compounds in materials																																																																																								
	<b>PLO-PO Matrix</b>																																																																																									
		<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>P.O</th> <th>PLO-8</th> <th>PLO-9</th> <th colspan="4">PLO-11</th> </tr> </thead> <tbody> <tr> <td>PO-1</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>PO-2</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>PO-3</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>						P.O	PLO-8	PLO-9	PLO-11				PO-1							PO-2							PO-3																																																													
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<b>PO Matrix at the end of each learning stage (Sub-PO)</b>																																																																																										
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<b>Short Course Description</b>	Discussion of the concepts of matter and energy, the concept of chemical bonds, measurements and basic laws of chemistry, the concept of chemical bonds and their types, water chemistry, calculations in chemical reactions, the concept of chemical solutions and solution concentration, the concepts of colloids and emulsions, acids, bases, salts and pH, and quantitative chemistry related to the field of nutrition. Learning is carried out using the Case Study model, as well as using discussion, question and answer methods and practice solving example problems																																																																																									
<b>References</b>	<b>Main :</b>																																																																																									
	<ol style="list-style-type: none"> <li>1. Burdge, Julia, 2011, Chemistry 2nd Ed. New York: McGraw-Hill</li> <li>2. Fessenden dan Fessenden. 1999. Kimia Organik Jilid 1. Edisi Ketiga, Alih Bahasa Aloysius Hadyana. Jakarta: Erlangga</li> <li>3. Hadyana Pudjaatmaka, A.1999. Ilmu Kimia Untuk Universitas, Jilid 1. Jakarta : Erlangga</li> <li>4. Harjadi, W. 2018. Stoikiometri: berhitung kimia itu mudah. Bogor: IPB Press</li> </ol>																																																																																									
	<b>Supporters:</b>																																																																																									
<b>Supporting lecturer</b>	Dra. Hj. Siti Sulandjari, M.Si. Noor Rohmah Mayasari, Ph.D.																																																																																									

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	Students understand the description of the Basic Chemistry course	Describe the contents of the RPS	<b>Criteria:</b> Can describe the contents of the Basic Chemistry RPS course which includes the expected final abilities, learning indicators, learning models used, and learning resources used	Method: Discussion and Question and Answer 2 X 50		<b>Material:</b> RPS <b>Library:</b>	2%
2	Students understand the concepts of matter and energy	<ol style="list-style-type: none"> <li>1.Explain the concept of matter</li> <li>2.Explain the concept of energy</li> <li>3.Classifying materials</li> <li>4.Describe the mixture</li> <li>5.Give examples of elements, compounds and mixtures in food</li> <li>6.Explain the difference between chemical changes and physical changes</li> <li>7.Give examples of physical and chemical changes in compounds in food</li> </ol>	<b>Criteria:</b> Provide answers or results according to the answer key or rubric  <b>Form of Assessment :</b> Participatory Activities, Tests	Cooperative Learning Model - Students discuss in groups - Students present the results of the discussion - Students conduct questions and answers - Lecturer guides students in making conclusions 2 X 50		<b>Matter:</b> Matter and Energy <b>Bibliography:</b> <i>Hadyana Pudjaatmaka, A.1999. Chemistry for Universities, Volume 1. Jakarta: Erlangga</i>	3%
3	Students understand atomic theory and the concept of chemical bonds and their various types	<ol style="list-style-type: none"> <li>1.Explain atomic theory and its relationship to electron configuration</li> <li>2.Explain the concept of chemical bonds</li> <li>3.Determine ionic compounds</li> <li>4.Define covalent compounds</li> <li>5.Define covalent compounds</li> <li>6.Explain hydrogen bonds</li> <li>7.Describe the various functional groups</li> </ol>	<b>Criteria:</b> Students will get maximum marks if they can answer the questions correctly  <b>Form of Assessment :</b> Participatory Activities, Portfolio Assessment	Case Study Model - Students study the problem of types of chemical bonds in food materials given by the lecturer - Students discuss in groups to solve the problem of types of compound bonds in materials - Students look for information/data to solve the problem - Students convey the results of problem solving steps - Based on input students make task report solving problems 2 X 50		<b>Material:</b> Chemical Bonds <b>Literature:</b> <i>Hadyana Pudjaatmaka, A.1999. Chemistry for Universities, Volume 1. Jakarta: Erlangga</i>	4%

4	Students understand mixtures in a colloidal state	<ol style="list-style-type: none"> <li>1. Compare solutions with colloids</li> <li>2. Explain the importance of colloid chemistry</li> <li>3. Describe the types of colloid systems</li> <li>4. Describe the properties of colloidal systems</li> <li>5. Give examples of solutions in food</li> <li>6. Give examples of colloids in foodstuffs or food</li> </ol>	<p><b>Criteria:</b> Describe the character of colloids and provide examples according to the answer key or rubric</p> <p><b>Form of Assessment :</b> Participatory Activities, Portfolio Assessment</p>	<p>Case Study learning model: - Students study problems related to the differences in properties between solutions, colloids and emulsions in making products - Students discuss in groups to plan problem solving - Students collect information/data to solve problems - Students present the results of problem solving carried out - Students make a report based on lecturer input and guidance 4 X 50</p>		<p><b>Material:</b> Solution: Colloidal State <b>Reference:</b> <i>Hadyana Pudjaatmaka, A.1999. Chemistry for Universities, Volume 1. Jakarta: Erlangga</i></p>	4%
5	Students understand acids and bases	<ol style="list-style-type: none"> <li>1. Explain the meaning of acids and bases</li> <li>2. Explain the properties of acids and bases</li> <li>3. Explain how to identify acids and bases</li> <li>4. Identify the function of acids and bases in food</li> </ol>	<p><b>Criteria:</b> Students will get a score if their answers or work results match the answer key or rubric</p> <p><b>Form of Assessment :</b> Participatory Activities, Tests</p>	<p>Cooperative Learning Model: - Discussing in groups to carry out assignments from the lecturer - Presenting the results of the discussion - Conducting questions and answers 2 X 50</p>		<p><b>Material:</b> Basic laws in chemical reactions <b>References:</b> <i>Harjadi, W. 2018. Stoichiometry: chemical calculations are easy. Bogor: IPB Press</i></p>	3%
6	Students understand acid and base compounds	<ol style="list-style-type: none"> <li>1. Identify the effect of acids and bases on food</li> <li>2. Calculate the pH of the solution</li> </ol>	<p><b>Criteria:</b> Students get a score if their answers or work results match the answer key or rubric</p> <p><b>Form of Assessment :</b> Participatory Activities, Portfolio Assessment</p>	<p>Case Study Model: - Students study cases of differences in reactions of materials to acid and base indicator extracts given by the lecturer - Students discuss in groups the relationship between reactions of materials and pH - Students practice calculating the pH of materials to prove that there is a difference in pH between the materials presented - Students present the results for get a response - Students make a 2 X 50 report</p>		<p><b>Material:</b> Acids and Bases <b>Reference:</b> <i>Hadyana Pudjaatmaka, A.1999. Chemistry for Universities, Volume 1. Jakarta: Erlangga</i></p>	4%

7	Students understand the basic laws of chemical reactions	<ol style="list-style-type: none"> <li>1.Explaining Avogadro's Law Determining molar mass</li> <li>2.Apply the mole concept to a reaction</li> <li>3.Counting the number of particles in a known unit weight of matter</li> </ol>	<p><b>Criteria:</b> Students demonstrate calculations of the number of particles and molar mass of a material according to the answer key or rubric</p> <p><b>Form of Assessment :</b> Portfolio Assessment, Test</p>	<p>Cooperative Learning: - Students listen to group discussion assignments about the basic laws required in chemical reactions - Students discuss in groups to do the assignment - Students present the results of the assignment to get responses from friends and lecturers - Conduct questions and answers - Students make a report on the results of the assignment 2 X 50</p>	<p><b>Material:</b> Measurements in chemical reactions <b>References:</b> <i>Harjadi, W. 2018. Stoichiometry: chemical calculations are easy. Bogor: IPB Press</i></p>	4%
8	UTS	Answer according to the answer key or rubric		2 X 50		20%
9		<ol style="list-style-type: none"> <li>1.Explain the meaning of chemical reactions</li> <li>2.Explain the reaction equation</li> <li>3.Perform chemical reaction balancing procedures</li> </ol>	<p><b>Criteria:</b> Students answer questions correctly according to the answer key or rubric</p> <p><b>Form of Assessment :</b> Participatory Activities, Tests</p>	<p>Discussion Presentation Questions and answers 2 X 50</p>	<p><b>Material:</b> Balancing reactions <b>References:</b> <i>Harjadi, W. 2018. Stoichiometry: chemical calculations are easy. Bogor: IPB Press</i></p>	2%
10	Students understand calculations in chemical reactions	<ol style="list-style-type: none"> <li>1.Explain the concept of limiting reagent</li> <li>2.Explain the steps to determine the limiting reagent</li> <li>3.Determining the applied limiting reagent in the field of Nutrition</li> </ol>	<p><b>Criteria:</b> Students will get maximum marks if they can answer questions according to the answer key or rubric</p> <p><b>Form of Assessment :</b> Participatory Activities, Portfolio Assessment</p>	<p>Lecture Discussion Assignment Direct learning 2 X 50</p>	<p><b>Material:</b> Limiting Reagents <b>References:</b> <i>Harjadi, W. 2018. Stoichiometry: chemical calculations are easy. Bogor: IPB Press</i></p>	2%
11	Students understand the statement of solution concentration	<ol style="list-style-type: none"> <li>1.Explain the meaning of various concentration statements</li> <li>2.Determine the concentration expression in percent of weight</li> <li>3.Determine the concentration expression in volume percent</li> <li>4.Determine the concentration expression in percent weight/volume</li> </ol>	<p><b>Criteria:</b> Produce solution concentration calculations in weight percent, volume percent, and weight/volume percent according to the answer key or rubric</p> <p><b>Form of Assessment :</b> Participatory Activities, Portfolio Assessment</p>	<p>- Demonstrate the procedure - Discuss the procedure - Practice determining concentration in percent - Present the results 2 X 50</p>	<p><b>Material:</b> Solution concentration statement <b>Reference:</b> <i>Harjadi, W. 2018. Stoichiometry: chemical calculations are easy. Bogor: IPB Press</i></p>	5%

12		<p>1. Analyze the case using the molar concentration expression</p> <p>2. Analyze the case using the concentration statement in ppm</p>	<p><b>Criteria:</b> Students will get maximum marks if they can answer the questions correctly</p> <p><b>Form of Assessment :</b> Participatory Activities, Portfolio Assessment</p>	<p>Case Study Model: - Studying cases of the impact of using different solution concentrations - Carrying out a case solving plan using the concentration formula in molar and ppm - Collecting information/data to solve the case - Making a report on the results of solving the case 2 X 50</p>		<p><b>Material:</b> Concentration statement <b>Reference:</b> <i>Harjadi, W. 2018. Stoichiometry: chemical calculations are easy. Bogor: IPB Press</i></p>	4%
13	Students understand water chemistry	<p>1.1. Explain the structure, bonds, chemical properties and dissociation of water 6. Explain water activity (Aw) in relation to water balance</p> <p>7. Explain Aw in relation to food durability</p> <p>2. Explain Explain Water in food (free and bound)</p> <p>3. Explain the types of water (crystalline water, constitution, adsorption, imbibition)</p> <p>4. Explain the types of water in food (types I – IV)</p> <p>5. Explain the levels and activity of water in food and related food spoilage</p> <p>6. Explain water activity (Aw) in relation to water balance</p>	<p><b>Criteria:</b> Students get the maximum score if they can analyze the type of water content in food ingredients and the role of water content in food ingredients correctly according to the answer key or rubric</p> <p><b>Form of Assessment :</b> Portfolio Assessment</p>	<p>Case Study Model: - Students study cases of changes in food ingredients with different water contents - Students discuss in groups to solve problems using water chemistry theory - Students present the results of problem solving - Students make problem solving reports 2 X 50</p>		<p><b>Material:</b> Water chemistry <b>Reference:</b> <i>Hadyana Pudjaatmaka, A. 1999. Chemistry for Universities, Volume 1. Jakarta: Erlangga</i></p>	0%
14	Students understand and recognize organic compounds	<p>1. Explain the meaning of organic compounds</p> <p>2. Give examples of Alkane compounds and their properties</p> <p>3. Give examples of alkene compounds and their properties</p> <p>4. Give examples of alkyne compounds and their properties</p>	<p><b>Criteria:</b> Students will get maximum marks if they can answer correctly according to the answer key</p> <p><b>Form of Assessment :</b> Participatory Activities, Tests</p>	<p>Cooperative learning: - Studying discussion assignments from the lecturer - Discussing in groups - Presenting the results of the discussion 2 X 50</p>		<p><b>Material:</b> Organic Chemistry <b>Library:</b> <i>Fessenden and Fessenden. 1999. Organic Chemistry Volume 1. Third Edition, Translated by Aloysius Hadyana. Jakarta: Erlangga</i></p>	3%

15	Students understand and recognize organic compounds	<ol style="list-style-type: none"> <li>1. Give examples of Alkanols and their properties</li> <li>2. Give examples of Ether and Ester compounds and their properties</li> <li>3. Provide examples of Alkanal compounds and their properties</li> <li>4. Give examples of Alkanone compounds and their properties</li> </ol>	<p><b>Criteria:</b> Students will get maximum marks if they can answer correctly according to the answer key or rubric</p> <p><b>Form of Assessment :</b> Participatory Activities, Tests</p>	Cooperative learning: - Studying assignments from doses - Discussing in groups working on assignments - Presenting the results of discussions 2 X 50		<p><b>Material:</b> Organic Chemistry <b>Library:</b> <i>Fessenden and Fessenden. 1999. Organic Chemistry Volume 1. Third Edition, Translated by Aloysius Hadyana. Jakarta: Erlangga</i></p> <p><b>Material:</b> Sulandjari, Siti. Efforts to Prevent Covid-19 by Making Antiseptic Soap Based on Tubers of the Teki Grass Weed (<i>Cyperus Rotundus L.</i>). PKM Final Report. 2020 <b>Library:</b></p>	3%
16			<p><b>Criteria:</b> Get a score if you answer the question correctly according to the answer key or rubric</p>				30%

#### Evaluation Percentage Recap: Project Based Learning

No	Evaluation	Percentage
1.	Participatory Activities	18.5%
2.	Portfolio Assessment	13.5%
3.	Test	9%
		41%

#### 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.