



**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
<b>SOLIDS &amp; SURFACE CHEMISTRY</b>	4720102120	Compulsory Study Program Subjects	T=2	P=0	ECTS=3.18	5	July 3, 2023
AUTHORIZATION	SP Developer	Course Cluster Coordinator	Study Program Coordinator				
	Prof. Dr. Harun Nasrudin, M.S; Bertha Yonata, S.Pd.,M.Pd.; Dian Novita, S.T.,M.Pd	Prof. Dr. Suyono, M.Pd.	Dr. Amaria, M.Si.				

Learning model	Case Studies
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Program Learning Outcomes (PLO)	PLO study program that is charged to the course																																																																																																					
Program Objectives (PO)																																																																																																						
<b>PO - 1</b>	Students are skilled in using tools to carry out viscosity, surface tension, adsorption and colloid analysis.																																																																																																					
<b>PO - 2</b>	Students have knowledge of surface properties as well as design and implementation of surface properties (viscosity, surface tension, adsorption, and colloids)																																																																																																					
<b>PO - 3</b>	Students have the ability to communicate the results of viscosity, surface tension, adsorption and colloid analysis so that they are able to develop a conceptual framework to formulate actions or alternative actions in solving chemical problems in life.																																																																																																					
<b>PO - 4</b>	Students have the ability to adapt to developments in chemistry by designing, implementing and reporting the results of experiments on viscosity, surface tension, adsorption and colloids.																																																																																																					
PLO-PO Matrix																																																																																																						
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PO Matrix at the end of each learning stage (Sub-PO)																																																																																																						
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Short Course Description	Study of surface properties, capillarity symptoms, surface thermodynamics, adsorption, surfactants, detergents, emulsions, bases and aerosols, chemisorption and catalysts
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References	<p><b>Main :</b></p> <ol style="list-style-type: none"> <li>Duncan J.S. 2004. Introduction to Colloid and Surface Chemistry . New York: Butter Worths.</li> <li>Adamson and Gost AP. 1977. Physical Chemistry of Surfaces 6th ed. New York : Wiley Inter Science.</li> </ol> <p><b>Supporters:</b></p>
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Supporting lecturer		Prof. Dr. Harun Nasrudin, M.S. Dian Novita, S.T., M.Pd. Bertha Yonata, S.Pd., M.Pd.					
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		1.Explain the meaning and scope 2.Explain the various types of viscometers	<b>Criteria:</b> 1.Able to explain the meaning and scope 2.Able to explain various types of viscometers  <b>Form of Assessment :</b> Participatory Activities	Discussion	Discussion	<b>Material:</b> Viscosity <b>Reference:</b> <i>Duncan JS 2004. I ntroduction to Colloid and Surface Chemistry . New York: Butter Worths.</i>  <b>Material:</b> Viscosity <b>Literature:</b> <i>Adamson and Gost AP. 1977. Physical Chemistry of Surfaces 6th ed. New York : Willey Inter Science.</i>	0%
2		1.Explain the viscosity coefficient 2.Explain the working principle of viscosity 3.Explain the various ways of measuring viscosity 4.Explain the factors that influence viscosity	<b>Criteria:</b> 1.Able to explain the viscosity coefficient 2.Able to explain the working principle of viscosity 3.Be able to explain various ways of measuring viscosity 4.Able to explain the factors that influence viscosity  <b>Form of Assessment :</b> Participatory Activities	Practice presentation and discussion questions	Practice presentation and discussion questions	<b>Material:</b> Viscosity <b>Reference:</b> <i>Duncan JS 2004. I ntroduction to Colloid and Surface Chemistry . New York: Butter Worths.</i>  <b>Material:</b> Viscosity <b>Literature:</b> <i>Adamson and Gost AP. 1977. Physical Chemistry of Surfaces 6th ed. New York : Willey Inter Science.</i>	5%
3	Understanding the thermodynamic properties of surfaces for surface tension studies	Explain the properties of surfaces in liquid matter	<b>Criteria:</b> Able to explain the surface properties of liquid matter  <b>Form of Assessment :</b> Participatory Activities	Discussion	Discussion	<b>Material:</b> Surface Tension <b>References:</b> <i>Duncan JS 2004. I ntroduction to Colloid and Surface Chemistry . New York: Butter Worths.</i>  <b>Material:</b> Surface Tension <b>References:</b> <i>Adamson and Gost AP. 1977. Physical Chemistry of Surfaces 6th ed. New York : Willey Inter Science.</i>	1%

4	Understanding the thermodynamic properties of surfaces for surface tension studies	Explain surface tension	<b>Criteria:</b> Be able to explain surface tension  <b>Form of Assessment :</b> Participatory Activities	Discussion	Discussion	<b>Material:</b> Surface Tension <b>References:</b> <i>Duncan JS 2004. I ntroduction to Colloid and Surface Chemistry . New York: Butter Worths.</i>  <b>Material:</b> Surface Tension <b>References:</b> <i>Adamson and Gost AP. 1977. Physical Chemistry of Surfaces 6th ed. New York : Willey Inter Science.</i>	1%
5	Understanding the thermodynamic properties of surfaces for adsorption studies	Explain the properties of surfaces in solid materials	<b>Criteria:</b> Able to explain the surface properties of solid materials  <b>Form of Assessment :</b> Participatory Activities	Discussion	Discussion	<b>Material:</b> Adsorption <b>Bibliography:</b> <i>Duncan JS 2004. I ntroduction to Colloid and Surface Chemistry . New York: Butter Worths.</i>	1%
6	Understanding the thermodynamic properties of surfaces for adsorption studies	Explain the properties of surfaces in solid materials	<b>Criteria:</b> Able to explain the surface properties of solid materials  <b>Form of Assessment :</b> Participatory Activities	Discussion	Discussion	<b>Material:</b> Adsorption <b>Bibliography:</b> <i>Duncan JS 2004. I ntroduction to Colloid and Surface Chemistry . New York: Butter Worths.</i>	1%
7	Understanding the thermodynamic properties of surfaces for adsorption studies	Explain the properties of surfaces in solid materials	<b>Criteria:</b> Able to explain the surface properties of solid materials  <b>Form of Assessment :</b> Participatory Activities	Discussion	Discussion	<b>Material:</b> Adsorption <b>Bibliography:</b> <i>Duncan JS 2004. I ntroduction to Colloid and Surface Chemistry . New York: Butter Worths.</i>	1%
8	<ol style="list-style-type: none"> <li>1. Definition and scope of viscosity</li> <li>2. Various types of viscometers</li> <li>3. Viscosity coefficient</li> <li>4. The working principle of a viscometer</li> <li>5. Viscosity measurement</li> <li>6. Factors that influence viscosity</li> <li>7. Surface properties in surface tension study material</li> </ol>	<ol style="list-style-type: none"> <li>1. Explain the meaning and scope of viscosity</li> <li>2. Explain the various types of viscometers</li> </ol>	<b>Criteria:</b> <ol style="list-style-type: none"> <li>1. Able to explain the meaning and scope of viscosity</li> <li>2. Able to explain various types of viscometers</li> </ol> <b>Form of Assessment :</b> Test	writing test	writing test	<b>Material:</b> Viscosity <b>Reference:</b> <i>Duncan JS 2004. I ntroduction to Colloid and Surface Chemistry . New York: Butter Worths.</i>  <b>Material:</b> Surface Tension <b>References:</b> <i>Duncan JS 2004. I ntroduction to Colloid and Surface Chemistry . New York: Butter Worths.</i>	20%

9	<p>1. Able to adapt to developments in chemical science through designing, implementing and analyzing the results of viscosity experiments based on phenomena obtained in the surrounding area and a study of scientific literature.</p> <p>2. Skilled in using tools to carry out viscosity analysis</p>	<p>Explain the working principle of viscosity</p>	<p><b>Criteria:</b> Able to explain the working principle of viscosity</p> <p><b>Form of Assessment :</b> Practice / Performance</p>	<p>1. Basic questions on the topic of viscosity</p> <p>2. Design a product plan</p> <p>3. Develop a manufacturing schedule</p> <p>4. Monitor product manufacturing</p>	<p>1. Basic questions on the topic of viscosity</p> <p>2. Design a product plan</p> <p>3. Develop a manufacturing schedule</p> <p>4. Monitor product manufacturing</p>	<p><b>Material:</b> Viscosity <b>Literature:</b> <i>Adamson and Gost AP. 1977. Physical Chemistry of Surfaces 6th ed. New York : Willey Inter Science.</i></p>	10%
10	<p>1. Able to adapt to developments in chemical science through designing, implementing and analyzing the results of surface tension experiments based on phenomena obtained in the surrounding area and studying scientific literature.</p> <p>2. Skilled in using tools to carry out surface tension analysis</p>	<p>1. Develop designs and carry out experiments related to surface tension</p> <p>2. Conduct experiments related to surface tension</p>	<p><b>Criteria:</b> 1. Able to prepare designs and carry out experiments related to surface tension</p> <p>2. Able to carry out experiments related to surface tension</p> <p><b>Form of Assessment :</b> Practice / Performance</p>	<p>1. Basic questions on the topic of surface tension</p> <p>2. Designing a product plan</p> <p>3. Developing a manufacturing schedule</p> <p>4. Monitoring product manufacturing</p>	<p>1. Basic questions on the topic of surface tension</p> <p>2. Designing a product plan</p> <p>3. Developing a manufacturing schedule</p> <p>4. Monitoring product manufacturing</p>	<p><b>Material:</b> Surface Tension <b>References:</b> <i>Duncan JS 2004. Introduction to Colloid and Surface Chemistry . New York: Butter Worths.</i></p>	10%
11	<p>1. Able to adapt to developments in chemical science through designing, implementing and analyzing the results of adsorption experiments based on phenomena obtained in the surrounding area and studying scientific literature.</p> <p>2. Skilled in using tools to carry out adsorption analysis</p>	<p>1. Explain the state of colloids in terms of particle size, type of colloid and their properties. Explain the kinetic properties of colloids</p> <p>2. Carrying out experiments related to adsorption</p>	<p><b>Criteria:</b> Able to carry out experiments related to adsorption</p> <p><b>Form of Assessment :</b> Practice / Performance</p>	<p>1. Basic questions on adsorption topics</p> <p>2. Design a product plan</p> <p>3. Develop a manufacturing schedule</p> <p>4. Monitor product manufacturing</p>	<p>1. Basic questions on adsorption topics</p> <p>2. Design a product plan</p> <p>3. Develop a manufacturing schedule</p> <p>4. Monitor product manufacturing</p>	<p><b>Material:</b> Adsorption <b>Bibliography:</b> <i>Duncan JS 2004. Introduction to Colloid and Surface Chemistry . New York: Butter Worths.</i></p>	0%
12	<p>Understand the colloid system and its use in daily life</p>	<p>1. Explain the optical properties of colloids</p> <p>2. Carrying out experiments related to colloids</p>	<p><b>Criteria:</b> Able to carry out experiments related to colloids</p> <p><b>Form of Assessment :</b> Participatory Activities, Practical Assessment</p>	<p>1. Basic questions on colloid topics</p> <p>2. Design a product plan</p> <p>3. Develop a manufacturing schedule</p> <p>4. Monitor product manufacturing</p>	<p>1. Basic questions on colloid topics</p> <p>2. Design a product plan</p> <p>3. Develop a manufacturing schedule</p> <p>4. Monitor product manufacturing</p>		0%

13	Understand the colloid system and its use in daily life	Explain the stability of colloids	<b>Criteria:</b> Explain the stability of colloids  <b>Form of Assessment :</b> Project Results Assessment / Product Assessment	1. Assessment of the results (assess the outcome) 2. Evaluation of the experience (evaluation the experience)	1. Assessment of the results (assess the outcome) 2. Evaluation of the experience (evaluation the experience)	<b>Material:</b> Colloids <b>Reference:</b> <i>Duncan JS 2004. Introduction to Colloid and Surface Chemistry . New York: Butter Worths.</i>	10%
14	Understand the colloid system and its use in daily life	Explain the stability of colloids	<b>Criteria:</b> Explain the stability of colloids  <b>Form of Assessment :</b> Project Results Assessment / Product Assessment	1. Assessment of the results (assess the outcome) 2. Evaluation of the experience (evaluation the experience)	1. Assessment of the results (assess the outcome) 2. Evaluation of the experience (evaluation the experience)	<b>Material:</b> Colloids <b>Reference:</b> <i>Duncan JS 2004. Introduction to Colloid and Surface Chemistry . New York: Butter Worths.</i>	10%
15	Understand the colloid system and its use in daily life	Explain the stability of colloids	<b>Criteria:</b> Explain the stability of colloids  <b>Form of Assessment :</b> Project Results Assessment / Product Assessment	1. Assessment of the results (assess the outcome) 2. Evaluation of the experience (evaluation the experience)	1. Assessment of the results (assess the outcome) 2. Evaluation of the experience (evaluation the experience)	<b>Material:</b> Colloids <b>Reference:</b> <i>Duncan JS 2004. Introduction to Colloid and Surface Chemistry . New York: Butter Worths.</i>	10%
16	Understand the colloid system and its use in daily life	Explain the stability of colloids	<b>Criteria:</b> Explain the stability of colloids  <b>Form of Assessment :</b> Project Results Assessment / Product Assessment	1. Assessment of the results (assess the outcome) 2. Evaluation of the experience (evaluation the experience)	1. Assessment of the results (assess the outcome) 2. Evaluation of the experience (evaluation the experience)	<b>Material:</b> Colloids <b>Reference:</b> <i>Duncan JS 2004. Introduction to Colloid and Surface Chemistry . New York: Butter Worths.</i>	10%

#### Evaluation Percentage Recap: Case Study

No	Evaluation	Percentage
1.	Participatory Activities	10%
2.	Project Results Assessment / Product Assessment	30%
3.	Practice / Performance	20%
4.	Test	20%
		80%

#### 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** 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.
- 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.

