



**Universitas Negeri Surabaya**  
**Faculty of Mathematics and Natural Sciences**  
**Undergraduate Chemistry Education 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>																																																																																																				
Chemical industry	8420402147	Study Program Elective Courses	T=2	P=0	ECTS=3.18	7	July 1, 2022																																																																																																				
<b>AUTHORIZATION</b>		<b>SP Developer</b>	<b>Course Cluster Coordinator</b>			<b>Study Program Coordinator</b>																																																																																																					
		Dian Novita, ST., M.Pd.	Prof. Dr. Nuniek Herdyastuti, M.Si.			Prof. Dr. Utiya Azizah, M.Pd.																																																																																																					
<b>Learning model</b>	Project Based Learning																																																																																																										
<b>Program Learning Outcomes (PLO)</b>	<b>PLO study program which is charged to the course</b>																																																																																																										
	<b>PLO-5</b>	Able to make decisions based on data/information in order to complete tasks that are their responsibility and evaluate performance that has been carried out both individually and in groups, has an entrepreneurial spirit with an environmental perspective (CPL 7)																																																																																																									
	<b>PLO-7</b>	Applying logical, critical, systematic and innovative thinking in the context of the development or implementation of science, technology and art that pays attention to and applies humanities values appropriate to the field of chemistry education in solving problems (CPL 5)																																																																																																									
	<b>PLO-11</b>	Able to demonstrate knowledge related to theoretical concepts about structure, dynamics and energy, as well as basic principles of separation, analysis, synthesis and characterization of chemicals (CPL 1)																																																																																																									
	<b>Program Objectives (PO)</b>																																																																																																										
	<b>PO - 1</b>	Students have the ability to collaborate in carrying out project assignments																																																																																																									
	<b>PO - 2</b>	Students are skilled at developing project assignment designs																																																																																																									
	<b>PO - 3</b>	Students have knowledge of the principles, basic concepts and chemical processes in the chemical industry, including the: oil industry which includes essential oils and oils from seeds; carbon industry; fermentation industry including tempeh, soy sauce, yogurt and wine, soap and detergent; paper industry including recycled paper; as well as the cosmetics industry, including facial soap, various facial creams, shampoos and cosmetic dyes.																																																																																																									
	<b>PO - 4</b>	Students have a responsible attitude towards project activities and their results																																																																																																									
	<b>PLO-PO Matrix</b>																																																																																																										
		<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th>P.O</th> <th>PLO-5</th> <th>PLO-7</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> <tr><td>PO-4</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </tbody> </table>						P.O	PLO-5	PLO-7	PLO-11				PO-1							PO-2							PO-3							PO-4																																																																							
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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>	Study of chemical processes in industry: oil, fermentation, soap, shampoo, detergent, paper, carbon and cosmetics through theoretical studies from textbooks and journals and ecopreneurship-based practices.																																																																																																										
<b>References</b>	<b>Main :</b>																																																																																																										
	1. Austin.G. 1986. The Chemical Proses Industries. New York : Mc Graw-Hill.																																																																																																										

		<b>Supporters:</b>					
		1. Journal-journal terkini yang terkait dengan masing-masing topik.					
<b>Supporting lecturer</b>		Prof. Dr. Titik Taufikurohmah, S.Si., M.Si. Prof. Dr. Nuniek Herdyastuti, M.Si. Dian Novita, S.T., 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	Understand learning contracts and assessment systems. Understand chemical processes in the petrochemical industry	Understand learning contracts and assessment systems. Understand processes in the petrochemical industry	<b>Criteria:</b> UTS UAS Assignment Participation  <b>Form of Assessment :</b> Participatory Activities	Lecture, question and answer 2 X 50		<b>Material:</b> introduction <b>Bibliography:</b> Austin.G. 1986. <i>The Chemical Process Industries</i> . New York: McGraw-Hill.	10%
2	Understand chemical processes in the oil industry	Understand the process of refining essential oils. Understand the process of isolating seed oils including soxcler extraction, pressing, fermentation and dissolution	<b>Criteria:</b> UTS UAS Assignment Participation  <b>Form of Assessment :</b> Participatory Activities	2 X 50 interactive lectures and discussions		<b>Material:</b> essential oil distillation process <b>Reference:</b> Austin.G. 1986. <i>The Chemical Process Industries</i> . New York: McGraw-Hill.	10%
3	Understand chemical processes in the fermentation industry	Understand how to make tempeh, soy sauce, yoghurt, wine	<b>Criteria:</b> UTS UAS Assignment Participation  <b>Form of Assessment :</b> Participatory Activities	2 X 50 interactive lectures and discussions		<b>Material:</b> making tempeh, soy sauce, yoghurt, wine <b>Reference:</b> Austin.G. 1986. <i>The Chemical Process Industries</i> . New York: McGraw-Hill.	10%
4	Understand chemical processes in the soap and detergent industry	Understand the process of making soap, detergent.	<b>Criteria:</b> UTS UAS Assignment Participation  <b>Form of Assessment :</b> Participatory Activities	Lecture and demonstration on the introduction of materials in front of the 2 X 50 class		<b>Material:</b> soap making, detergent. <b>Bibliography:</b> Austin.G. 1986. <i>The Chemical Process Industries</i> . New York: McGraw-Hill.	10%
5	Understand chemical processes in the paper industry	Understand the paper making process	<b>Criteria:</b> UTS UAS Assignment Participation  <b>Form of Assessment :</b> Participatory Activities	Journal review discussion 1 X 50		<b>Material:</b> paper making process <b>Reference:</b> Austin.G. 1986. <i>The Chemical Process Industries</i> . New York: McGraw-Hill.	10%
6	Understand chemical processes in the carbon industry	Understand the process of making carbon	<b>Criteria:</b> UTS UAS Assignment Participation  <b>Form of Assessment :</b> Participatory Activities	Theoretical discussions from textbooks and journals 2 X 50		<b>Material:</b> carbon manufacturing process <b>Reference:</b> Austin.G. 1986. <i>The Chemical Process Industries</i> . New York: McGraw-Hill.	10%

7	Understand chemical processes in the cosmetics industry.	Understand the cosmetic manufacturing process	<b>Criteria:</b> UTS UAS Assignment Participation  <b>Form of Assessment :</b> Project Results Assessment / Product Assessment	Theoretical discussions from textbooks and journals 2 X 50		<b>Material:</b> chemical processes in the cosmetics industry  <b>Reference:</b> <i>Austin.G. 1986. The Chemical Process Industries. New York: McGraw-Hill.</i>	20%
8	Covers meetings 1-7	Covers meetings 1-7	<b>Criteria:</b> UTS	Written test 2 X 50			20%
9	Understand the process and results of oil processing practicum, fermentation practicum results, soap, detergent and cosmetic making practicum results; and the results of ecopreneurship-based paper processing practicum.	Understand the results of oil processing practicum, fermentation practicum results, soap, detergent and cosmetic making practicum results; and paper processing practicum results	<b>Criteria:</b> UTS UAS Assignment Participation  <b>Forms of Assessment :</b> Participatory Activities, Project Results Assessment / Product Assessment, Practical Assessment	Practical, Discussion 6 X 50		<b>Material:</b> process and results of oil processing practicum, results of fermentation practicum, results of soap, detergent and cosmetic making practicum; and the results of ecopreneurship-based paper processing practicum.  <b>Bibliography:</b> <i>Austin.G. 1986. The Chemical Process Industries. New York: McGraw-Hill.</i>	20%
10	Understand the process and results of oil processing practicum, fermentation practicum results, soap, detergent and cosmetic making practicum results; and the results of ecopreneurship-based paper processing practicum.	Understand the results of oil processing practicum, fermentation practicum results, soap, detergent and cosmetic making practicum results; and paper processing practicum results	<b>Criteria:</b> UTS UAS Assignment Participation  <b>Forms of Assessment :</b> Project Results Assessment / Product Assessment, Practical Assessment	Practical, Discussion 6 X 50		<b>Material:</b> process and results of oil processing practicum, results of fermentation practicum, results of soap, detergent and cosmetic making practicum; and the results of ecopreneurship-based paper processing practicum.  <b>Bibliography:</b> <i>Austin.G. 1986. The Chemical Process Industries. New York: McGraw-Hill.</i>	20%

11	Understand the process and results of oil processing practicum, fermentation practicum results, soap, detergent and cosmetic making practicum results; and the results of ecopreneurship-based paper processing practicum.	Understand the results of oil processing practicum, fermentation practicum results, soap, detergent and cosmetic making practicum results; and paper processing practicum results	<b>Criteria:</b> UTS UAS Assignment Participation  <b>Form of Assessment :</b> Practical Assessment, Practice/Performance	Practical, Discussion 6 X 50		<b>Material:</b> process and results of oil processing practicum, results of fermentation practicum, results of soap, detergent and cosmetic making practicum; and the results of ecopreneurship-based paper processing practicum. <b>Bibliography:</b> <i>Austin.G. 1986. The Chemical Process Industries. New York: McGraw-Hill.</i> <hr/> <b>Material:</b> process and results of oil processing practicum, results of fermentation practicum, results of soap, detergent and cosmetic making practicum; and the results of ecopreneurship-based paper processing practicum. <b>Library:</b> <i>The latest journals related to each topic.</i>	30%
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12	Understand the process and results of oil processing practicum, fermentation practicum results, soap, detergent and cosmetic making practicum results; and the results of ecopreneurship-based paper processing practicum.	Understand the results of oil processing practicum, fermentation practicum results, soap, detergent and cosmetic making practicum results; and paper processing practicum results	<b>Criteria:</b> UTS UAS Assignment Participation  <b>Form of Assessment :</b> Participatory Activities	Practical, Discussion 6 X 50		<b>Material:</b> process and results of oil processing practicum, results of fermentation practicum, results of soap, detergent and cosmetic making practicum; and the results of ecopreneurship-based paper processing practicum. <b>Bibliography:</b> <i>Austin.G. 1986. The Chemical Process Industries. New York: McGraw-Hill.</i> <hr/> <b>Material:</b> process and results of oil processing practicum, results of fermentation practicum, results of soap, detergent and cosmetic making practicum; and the results of ecopreneurship-based paper processing practicum. <b>Library:</b> <i>The latest journals related to each topic.</i>	10%
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13	Understand the process and results of oil processing practicum, fermentation practicum results, soap, detergent and cosmetic making practicum results; and the results of ecopreneurship-based paper processing practicum.	Understand the results of oil processing practicum, fermentation practicum results, soap, detergent and cosmetic making practicum results; and paper processing practicum results	<b>Criteria:</b> UTS UAS Assignment Participation  <b>Form of Assessment :</b> Project Results Assessment / Product Assessment	Practical, Discussion 6 X 50		<b>Material:</b> process and results of oil processing practicum, results of fermentation practicum, results of soap, detergent and cosmetic making practicum; and the results of ecopreneurship-based paper processing practicum. <b>Bibliography:</b> <i>Austin.G. 1986. The Chemical Process Industries. New York: McGraw-Hill.</i> <hr/> <b>Material:</b> process and results of oil processing practicum, results of fermentation practicum, results of soap, detergent and cosmetic making practicum; and the results of ecopreneurship-based paper processing practicum. <b>Library:</b> <i>The latest journals related to each topic.</i>	20%
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14	Understand the process and results of oil processing practicum, fermentation practicum results, soap, detergent and cosmetic making practicum results; and the results of ecopreneurship-based paper processing practicum.	Understand the results of oil processing practicum, fermentation practicum results, soap, detergent and cosmetic making practicum results; and paper processing practicum results	<p><b>Criteria:</b> UTS UAS Assignment Participation</p> <p><b>Forms of Assessment</b> : Project Results Assessment / Product Assessment, Practical Assessment</p>	Practical, Discussion 6 X 50		<p><b>Material:</b> process and results of oil processing practicum, results of fermentation practicum, results of soap, detergent and cosmetic making practicum; and the results of ecopreneurship-based paper processing practicum.</p> <p><b>Bibliography:</b> <i>Austin.G. 1986. The Chemical Process Industries. New York: McGraw-Hill.</i></p> <hr/> <p><b>Material:</b> process and results of oil processing practicum, results of fermentation practicum, results of soap, detergent and cosmetic making practicum; and the results of ecopreneurship-based paper processing practicum.</p> <p><b>Library:</b> <i>The latest journals related to each topic.</i></p>	20%
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15	Understand the process and results of oil processing practicum, fermentation practicum results, soap, detergent and cosmetic making practicum results; and the results of ecopreneurship-based paper processing practicum.	Understand the results of oil processing practicum, fermentation practicum results, soap, detergent and cosmetic making practicum results; and paper processing practicum results	<b>Criteria:</b> UTS UAS Assignment Participation  <b>Forms of Assessment :</b> Project Results Assessment / Product Assessment, Practical Assessment, Practice / Performance	Practical, Discussion 6 X 50		<b>Material:</b> process and results of oil processing practicum, results of fermentation practicum, results of soap, detergent and cosmetic making practicum; and the results of ecopreneurship-based paper processing practicum. <b>Bibliography:</b> <i>Austin.G. 1986. The Chemical Process Industries. New York: McGraw-Hill.</i> <hr/> <b>Material:</b> process and results of oil processing practicum, results of fermentation practicum, results of soap, detergent and cosmetic making practicum; and the results of ecopreneurship-based paper processing practicum. <b>Library:</b> <i>The latest journals related to each topic.</i>	20%
16	Covers meetings 9-15	Covers meetings 9-15	<b>Criteria:</b> UAS questions and presentation skills	Written test and presentation 2 X 50		<b>Material:</b> process and results of oil processing practicum, results of fermentation practicum, results of soap, detergent and cosmetic making practicum; and the results of ecopreneurship-based paper processing practicum. <b>Library:</b> <i>The latest journals related to each topic.</i>	30%

#### Evaluation Percentage Recap: Project Based Learning

No	Evaluation	Percentage
1.	Participatory Activities	76.67%
2.	Project Results Assessment / Product Assessment	73.34%
3.	Practical Assessment	48.34%
4.	Practice / Performance	21.67%
		100%

#### 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.