



Universitas Negeri Surabaya
Faculty of Mathematics and Natural Sciences
Master of Science Education Study Program

Document Code

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date																																																																																																																						
Chemical Science Study III	8410103089		T=3	P=0	ECTS=6.72	3	August 15, 2022																																																																																																																						
AUTHORIZATION	SP Developer		Course Cluster Coordinator			Study Program Coordinator																																																																																																																							
	Prof. Dr. Suyatno, M.Si.		Prof. Dr. Suyatno, M.Si.			Dr. Eko Hariyono, S.Pd., M.Pd.																																																																																																																							
Learning model	Case Studies																																																																																																																												
Program Learning Outcomes (PLO)	PLO study program which is charged to the course																																																																																																																												
	Program Objectives (PO)																																																																																																																												
	PO - 1	Mastering the structure, physical properties, reactivity and synthesis of alkene compounds																																																																																																																											
	PO - 2	Mastering the stereochemistry of organic compounds																																																																																																																											
	PO - 3	Mastering the mechanism of substitution reactions in organic compounds																																																																																																																											
	PO - 4	Mastering the mechanism of elimination reactions in organic compounds																																																																																																																											
	PO - 5	Mastering the mechanism of condensation reactions in organic compounds																																																																																																																											
	PLO-PO Matrix																																																																																																																												
		<table border="1" style="margin-left: auto; margin-right: auto;"> <tr><td>P.O</td></tr> <tr><td>PO-1</td></tr> <tr><td>PO-2</td></tr> <tr><td>PO-3</td></tr> <tr><td>PO-4</td></tr> <tr><td>PO-5</td></tr> </table>	P.O	PO-1	PO-2	PO-3	PO-4	PO-5																																																																																																																					
	P.O																																																																																																																												
PO-1																																																																																																																													
PO-2																																																																																																																													
PO-3																																																																																																																													
PO-4																																																																																																																													
PO-5																																																																																																																													
PO Matrix at the end of each learning stage (Sub-PO)																																																																																																																													
	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th rowspan="2">P.O</th> <th colspan="16">Week</th> </tr> <tr> <th>1</th><th>2</th><th>3</th><th>4</th><th>5</th><th>6</th><th>7</th><th>8</th><th>9</th><th>10</th><th>11</th><th>12</th><th>13</th><th>14</th><th>15</th><th>16</th> </tr> </thead> <tbody> <tr><td>PO-1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></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><td></td><td></td><td></td><td></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><td></td><td></td><td></td><td></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><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>PO-5</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </tbody> </table>	P.O	Week																1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	PO-1																	PO-2																	PO-3																	PO-4																	PO-5																						
P.O	Week																																																																																																																												
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16																																																																																																													
PO-1																																																																																																																													
PO-2																																																																																																																													
PO-3																																																																																																																													
PO-4																																																																																																																													
PO-5																																																																																																																													
Short Course Description	This course examines organic chemistry concepts, including stereochemistry (geometric isomers, optical isomers), alkene addition reaction mechanisms, nucleophilic substitution reactions (SN-1, SN-2), radical substitution reactions, electrophilic substitution reactions in aromatic compounds, reactions elimination (E-1, E-2), as well as condensation reactions (aldol, Knoevenagel, Claisen). The strategy for presenting this material includes presentation and discussion of independent and/or group assignments.																																																																																																																												
References	Main :																																																																																																																												
	<ol style="list-style-type: none"> 1. Carey, F.A. (2000). Organic Chemistry. 4rd Ed. New York: McGraw-Hill Companies, Inc. 2. Michael B. Smith, M.B. & March, J. (2007). March's Advanced Organic Chemistry, Reaction, Mechanism, and Structure, 6th ed. New Jersey: John Wiley and Son, Inc. 3. Smith, J.G. (2011). Organic Chemistry. 3th Ed. New York: Mc Graw-Hill Book. 4. Solomon, T.W.G. & Fryhle, C.B. (2011). Organic Chemistry. New York: John Wiley & Sons, Inc 																																																																																																																												
	Supporters:																																																																																																																												

	1. Artikel terbaru dalam jurnal yang relevan						
Supporting lecturer	Prof. Dr. Suyatno, M.Si. Prof. Dr. Tukiran, 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 the Structure and Creation of Alkenes (Elimination Reactions)	<ol style="list-style-type: none"> 1.Explain the structure of alkenes in terms of the carbon-carbon double bond group 2.Explain the physical properties of alkenes 3.Write down the elimination reaction mechanism in alkene synthesis 	<p>Criteria: Assessment of participation and assignments</p> <p>Form of Assessment : Project Results Assessment / Product Assessment</p>	Group presentation, discussion, question and answer, and practice questions 3 x 50 minutes	<ul style="list-style-type: none"> • Lecture coordination using WAG • Synchronous via Zoom/Gmeet • Material, information and assignments can be accessed via Vinesa 4 x 50 minutes 	<p>Material: Structure, physical properties and synthesis of alkenes</p> <p>References:</p>	5%
2	Understanding the Structure and Creation of Alkenes (Elimination Reactions)	<ol style="list-style-type: none"> 1.Explain the structure of alkenes in terms of the carbon-carbon double bond group 2.Explain the physical properties of alkenes 3.Write down the elimination reaction mechanism in alkene synthesis 	<p>Criteria: Assessment of participation and assignments</p> <p>Form of Assessment : Project Results Assessment / Product Assessment</p>	Group presentation, discussion, question and answer, and practice questions 3 x 50 minutes	<ul style="list-style-type: none"> • Lecture coordination using WAG • Synchronous via Zoom/Gmeet • Material, information and assignments can be accessed via Vinesa 4 x 50 minutes 	<p>Material: Structure, physical properties and synthesis of alkenes</p> <p>References:</p>	5%
3	Understand the basic principles of addition reactions in alkene compounds	<ol style="list-style-type: none"> 1.Mention various types of addition reactions in alkene compounds 2.Explain the various types of addition reactions in alkene compounds and give examples of the reactions. Write down the mechanisms of various types of addition reactions in alkene compounds and give examples of the reactions. 	<p>Criteria: Assessment of participation and assignments</p>	Group presentation, discussion, question and answer, and practice questions 3 x 50 minutes	<ul style="list-style-type: none"> • Lecture coordination using WAG • Synchronous via Zoom/Gmeet • Material, information and assignments can be accessed via Vinesa 4 x 50 minutes 	<p>Material: Mechanism of alkene addition reactions</p> <p>References:</p>	5%
4	Understand the basic principles of addition reactions in alkene compounds	<ol style="list-style-type: none"> 1.Mention various types of addition reactions in alkene compounds 2.Explain the various types of addition reactions in alkene compounds and give examples of the reactions. Write down the mechanisms of various types of addition reactions in alkene compounds and give examples of the reactions. 	<p>Criteria: Assessment of participation and assignments</p> <p>Form of Assessment : Project Results Assessment / Product Assessment</p>	Group presentation, discussion, question and answer, and practice questions 3 x 50 minutes	<ul style="list-style-type: none"> • Lecture coordination using WAG • Synchronous via Zoom/Gmeet • Material, information and assignments can be accessed via Vinesa 4 x 50 minutes 	<p>Material: Mechanism of alkene addition reactions</p> <p>References:</p>	5%

5	Understanding the stereochemistry of an organic compound	<ol style="list-style-type: none"> 1.Explain cis-trans geometric isomers 2.Explain cis-trans geometric isomers 3.Explain chirality in organic compounds 4.Determine the absolute configuration of an organic compound 5.Distinguish between enantiomers, diastereoisomers, and meso 6.Describe racemic mixtures 	<p>Criteria: Assessment of participation and assignments</p> <p>Form of Assessment : Project Results Assessment / Product Assessment</p>	Group presentation, discussion, question and answer, and practice questions 3 x 50 minutes	<ul style="list-style-type: none"> ● Lecture coordination using WAG ● Synchronous via Zoom/Gmeet ● Material, information and assignments can be accessed via Vinesa 4 x 50 minutes 	<p>Material: Geometric isomerism, chirality, absolute configuration, enantiomers, diastereoisomers, meso and racemic mixtures</p> <p>References:</p>	7%
6	Understanding the stereochemistry of a compound Determining the absolute configuration of an organic compound	<ol style="list-style-type: none"> 1.Explain cis-trans geometric isomers 2.Explain cis-trans geometric isomers 3.Explain chirality in organic compounds 4.Determine the absolute configuration of an organic compound 5.Distinguish between enantiomers, diastereoisomers, and meso 6.Describe racemic mixtures 	<p>Criteria: Assessment of participation and assignments</p> <p>Form of Assessment : Project Results Assessment / Product Assessment</p>	Group presentation, discussion, question and answer, and practice questions 3 x 50 minutes	<ul style="list-style-type: none"> ● Lecture coordination using WAG ● Synchronous via Zoom/Gmeet ● Material, information and assignments can be accessed via Vinesa 4 x 50 minutes 	<p>Material: Geometric isomerism, chirality, absolute configuration, enantiomers, diastereoisomers, meso and racemic mixtures</p> <p>References:</p>	7%
7	Understanding the stereochemistry of a compound Determining the absolute configuration of an organic compound	<ol style="list-style-type: none"> 1.Explain cis-trans geometric isomers 2.Explain cis-trans geometric isomers 3.Explain chirality in organic compounds 4.Determine the absolute configuration of an organic compound 5.Distinguish between enantiomers, diastereoisomers, and meso 6.Describe racemic mixtures 	<p>Criteria: Assessment of participation and assignments</p> <p>Form of Assessment : Project Results Assessment / Product Assessment</p>	Group presentation, discussion, question and answer, and practice questions 3 x 50 minutes	<ul style="list-style-type: none"> ● Lecture coordination using WAG ● Synchronous via Zoom/Gmeet ● Material, information and assignments can be accessed via Vinesa 4 x 50 minutes 	<p>Material: Geometric isomerism, chirality, absolute configuration, enantiomers, diastereoisomers, meso and racemic mixtures</p> <p>References:</p>	7%
8	Final Capabilities from TM-1 to TM-7	TM-1 indicators up to TM-7 indicators	<p>Criteria: Attached</p>	Written test or assignment as a substitute for UTS 3 x 50 minutes			5%

9	Understanding the mechanism of nucleophilic substitution reactions (SN1 and SN2)	<ol style="list-style-type: none"> 1.Explain the mechanism of bimolecular nucleophilic substitution (SN2) reactions 2.Explain the factors that influence the rate of bimolecular nucleophilic substitution (SN2) reactions 3.Explain the mechanism of bimolecular nucleophilic substitution (SN1) reactions 4.Explain the factors that influence the rate of bimolecular nucleophilic substitution (SN1) reactions 	<p>Criteria: Assessment of participation and assignments</p> <p>Form of Assessment : Project Results Assessment / Product Assessment</p>	Reference studies, assignments, discussions and presentations 3 x 50 minutes	<ul style="list-style-type: none"> ● Lecture coordination using WAG ● Synchronous via Zoom/Gmeet ● Material, information and assignments can be accessed via Vinesa 6 x 50 minutes 	<p>Material: Mechanism of nucleophilic substitution reactions SN-1 and SN-2</p> <p>References:</p>	7%
10	Understand the mechanism of elimination reactions (E1 and E2)	<ol style="list-style-type: none"> 1.Explain the mechanism of bimolecular elimination reactions (E2) 2.Explain the factors that influence the rate of bimolecular elimination reactions (E2) 3.Explain the reaction mechanism of the unimolecular elimination reaction (E1) 4.3. Explain the factors that influence the rate of unimolecular elimination reactions (E1) 	<p>Criteria: Assessment of participation and assignments</p> <p>Form of Assessment : Project Results Assessment / Product Assessment</p>	Reference studies, assignments, discussions and presentations 3 x 50 minutes	<ul style="list-style-type: none"> ● Lecture coordination using WAG ● Synchronous via Zoom/Gmeet ● Material, information and assignments can be accessed via Vinesa 6 x 50 minutes 	<p>Material: Mechanism of elimination reactions E-1 and E-2</p> <p>References:</p>	7%
11	Understand the mechanism of free radical substitution reactions	<ol style="list-style-type: none"> 1.Explain the mechanism of free radical substitution reactions 2.Explain the factors that influence the rate of free radical substitution reactions 	<p>Criteria: Assessment of participation and assignments</p>	Reference studies, assignments, discussions and presentations 3 x 50 minutes	<ul style="list-style-type: none"> ● Lecture coordination using WAG ● Synchronous via Zoom/gmeet ● Material, information and assignments can be accessed via Vinesa. 6 x 50 minutes 	<p>Material: Mechanism of free radical substitution reactions</p> <p>References:</p>	7%
12	Understand the mechanism of electrophilic substitution reactions in aromatic compounds	<ol style="list-style-type: none"> 1.Explain the aromaticity of organic compounds 2.Explain the mechanism of electrophilic substitution reactions in aromatic compounds (halogenation, nitration, alkylation, acylation and sulfonation) Write down the mechanism of acylation type electrophilic substitution reactions 	<p>Criteria: Assessment of participation and assignments</p> <p>Form of Assessment : Project Results Assessment / Product Assessment</p>	Reference studies, assignments, discussions and presentations 3 x 50 minutes	<ul style="list-style-type: none"> ● Lecture coordination using WAG ● Synchronous via Zoom/Gmeet ● Material, information and assignments can be accessed via Vinesa 8 x 50 minutes 	<p>Material: Aromaticity of organic compounds, mechanisms of electrophilic substitution reactions in aromatic compounds (halogenation, nitration, alkylation, acylation and sulfonation)</p> <p>References:</p>	7%

13	Understand the mechanism of electrophilic substitution reactions in aromatic compounds	<ol style="list-style-type: none"> 1.Explain the aromaticity of organic compounds 2.Explain the mechanism of electrophilic substitution reactions in aromatic compounds (halogenation, nitration, alkylation, acylation and sulfonation) Write down the mechanism of acylation type electrophilic substitution reactions 	Criteria: Assessment of participation and assignments Form of Assessment : Project Results Assessment / Product Assessment	Reference studies, assignments, discussions and presentations 3 x 50 minutes	<ul style="list-style-type: none"> • Lecture coordination using WAG • Synchronous via Zoom/Gmeet • Material, information and assignments can be accessed via Vinesa 8 x 50 minutes 	Material: Aromaticity of organic compounds, mechanisms of electrophilic substitution reactions in aromatic compounds (halogenation, nitration, alkylation, acylation and sulfonation) References:	7%
14	Understand the mechanism of condensation reactions in organic compounds	<ol style="list-style-type: none"> 1.Explain the mechanism of aldol condensation reactions 2.Explain the mechanism of the Knoevenagel condensation reaction 3.Explain the mechanism of the Claisen condensation reaction 	Criteria: Assessment of participation and assignments Form of Assessment : Project Results Assessment / Product Assessment	Reference studies, assignments, discussions and presentations 3 x 50 minutes	<ul style="list-style-type: none"> • Lecture coordination using WAG • Synchronous via Zoom/Gmeet • Material, information and assignments can be accessed via Vinesa 8 x 50 minutes 	Material: Aldol, Knoevenagel and Claisen condensation reaction mechanisms in organic compounds References:	7%
15	Understand the mechanism of condensation reactions in organic compounds	<ol style="list-style-type: none"> 1.Explain the mechanism of aldol condensation reactions 2.Explain the mechanism of the Knoevenagel condensation reaction 3.Explain the mechanism of the Claisen condensation reaction 	Criteria: Assessment of participation and assignments Form of Assessment : Project Results Assessment / Product Assessment	Reference studies, assignments, discussions and presentations 3 x 50 minutes	<ul style="list-style-type: none"> • Lecture coordination using WAG • Synchronous via Zoom/Gmeet • Material, information and assignments can be accessed via Vinesa 8 x 50 minutes 	Material: Aldol, Knoevenagel and Claisen condensation reaction mechanisms in organic compounds References:	7%
16	Final Capabilities from TM-9 to TM-15	TM-9 indicators up to TM-15 indicators	Criteria: Attached	Written test or giving substitute assignments for UAS 3 x 50 minutes			5%

Evaluation Percentage Recap: Case Study

No	Evaluation	Percentage
1.	Project Results Assessment / Product Assessment	78%
		78%

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** 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.
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.