



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
ORGANIC SYNTHESIS	4720102166	Organic Chemistry	T=2	P=0	ECTS=3.18	5	April 27, 2023
AUTHORIZATION	SP Developer		Course Cluster Coordinator			Study Program Coordinator	
	Prof. Dr. Suyatno, M.Si.		Prof. Dr. Suyatno, M.Si.			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)

PO - 1	Understand the meaning, uses, principles of organic chemical synthesis
PO - 2	Understand the types of organic reactions, functional group functionalization processes, functional group interconversion
PO - 3	Understand the types of organic reactions for the formation of carbon skeletons
PO - 4	Understand the basic principles in designing the synthesis of organic compounds
PO - 5	Understanding synthesis strategies through breaking carbon-heteroatom bonds
PO - 6	Understand synthesis strategies through breaking carbon-carbon bonds
PO - 7	Understand synthesis strategies through breaking down aromatic compounds
PO - 8	Understanding the meaning, selection of protective groups and application of protective groups in organic synthesis
PO - 9	Understanding chemoselectivity and stereoselectivity in organic synthesis

PLO-PO Matrix

	<table border="1"><tbody><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><tr><td>PO-6</td></tr><tr><td>PO-7</td></tr><tr><td>PO-8</td></tr><tr><td>PO-9</td></tr></tbody></table>	P.O	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9
P.O											
PO-1											
PO-2											
PO-3											
PO-4											
PO-5											
PO-6											
PO-7											
PO-8											
PO-9											

PO Matrix at the end of each learning stage (Sub-PO)

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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																	
PO-6																	
PO-7																	
PO-8																	
PO-9																	

Short Course Description	Study of functional group functionalization, functional group interconversion, formation of carbon-carbon bonds and carbon-heteroatom bonds, target molecules, synthon and disconnection approaches, synthesis strategies, protecting groups, chemoselective and stereoselective reactions.
References	<p>Main :</p> <ol style="list-style-type: none"> 1. Carruthers, W. & Coldam, I. (2004). <i>Modern Methods of Organic Synthesis</i>. 4th Ed. New York: Cambridge University Press. 2. Michael B. Smith, M.B. & March, J. (2007). <i>March's Advanced Organic Chemistry, Reaction, Mechanism, and Structure</i>, 6th ed. New Jersey: John Wiley and Son, Inc. 3. Tukiran dan Suyatno (2018). <i>Sintesis Kimia Organik</i>. Surabaya: Unesa University Press. 4. Warren, S. & Wyatt, P. (2008). <i>Organic Synthesis: the Disconnection Approach</i>. 2nd Ed. London: John Wiley and Sons, Inc. <p>Supporters:</p> <ol style="list-style-type: none"> 1. Artikel dalam jurnal ilmiah yang terkait dengan sintesis senyawa organik
Supporting lecturer	Prof. Dr. Suyatno, M.Si. Prof. Dr. Tukiran, M.Si. Dr. Ratih Dewi Saputri, S.Si., M.Si. Dr. First Ambar Wati, S.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	Understand the meaning, uses, principles of organic chemical synthesis	Accuracy in explaining the meaning, uses, principles of organic chemical synthesis	<p>Criteria: Based on the assessment rubric that has been created by the teaching lecturer</p> <p>Form of Assessment : Participatory Activities</p>	Question and answer, discussion, presentation, and case method 2 X 50 minutes	Question and answer, discussion, presentation, and case method 2 X 50 minutes	<p>Material: Definition, uses, principles of organic chemical synthesis.</p> <p>Reference: <i>Tukiran and Suyatno (2018). Organic Chemical Synthesis. Surabaya: Unesa University Press.</i></p>	5%
2	Understand the types of organic reactions, functional group functionalization processes, functional group interconversion	Accuracy in explaining the types of organic reactions, the process of functionalization of functional groups, interconversion of functional groups	<p>Criteria: Based on the assessment rubric that has been created by the teaching lecturer</p> <p>Form of Assessment : Project Results Assessment / Product Assessment, Test</p>	Question and answer, discussion, presentation and case method 2x50 minutes	Question and answer, discussion, presentation and case method 2x50 minutes	<p>Material: Types of organic reactions, functionalization processes of functional groups, interconversion of functional groups.</p> <p>Reference: <i>Carruthers, W. & Coldam, I. (2004). Modern Methods of Organic Synthesis. 4th Ed. New York: Cambridge University Press.</i></p>	10%

3	Understand the types of organic reactions for the formation of carbon skeletons	Accuracy in explaining the types of organic reactions for the formation of carbon skeletons	<p>Criteria: Based on the assessment rubric that has been created by the teaching lecturer</p> <p>Form of Assessment : Project Results Assessment / Product Assessment, Test</p>	Question and answer, discussion, presentation, and case method 2 X 50 minutes	Question and answer, discussion, presentation and case method 2x50 minutes	<p>Material: Types of organic reactions for the formation of carbon skeletons</p> <p>References: <i>Michael B. Smith, MB & March, J. (2007). March's Advanced Organic Chemistry, Reaction, Mechanism, and Structure, 6th ed. New Jersey: John Wiley and Son, Inc.</i></p>	10%
4	Understand the basic principles in designing the synthesis of organic compounds	Accuracy in explaining the basic principles in designing the synthesis of organic compounds	<p>Criteria: Based on the assessment rubric that has been created by the teaching lecturer</p> <p>Form of Assessment : Project Results Assessment / Product Assessment</p>	Question and answer, discussion, presentation, and case method 2 X 50 minutes	Question and answer, discussion, presentation and case method 2 x 50 minutes	<p>Material: Basic principles in designing the synthesis of organic compounds.</p> <p>Reference: <i>Warren, S. & Wyatt, P. (2008). Organic Synthesis: the Disconnection Approach. 2nd Ed. London: John Wiley and Sons, Inc.</i></p>	5%
5	Understanding synthesis strategies through breaking carbon-heteroatom bonds	Accuracy in explaining synthesis strategies through breaking carbon-heteroatom bonds	<p>Criteria: Based on the assessment rubric that has been created by the teaching lecturer</p> <p>Form of Assessment : Assessment of Project Results / Product Assessment, Practices / Performance</p>	Question and answer, discussion, presentation, and case method 2X 50 minutes	Question and answer, discussion, presentation and case method 2x50 minutes	<p>Material: Synthesis strategy through breaking carbon-heteroatom bonds</p> <p>References: <i>Warren, S. & Wyatt, P. (2008). Organic Synthesis: the Disconnection Approach. 2nd Ed. London: John Wiley and Sons, Inc.</i></p>	10%
6	Understand synthesis strategies through breaking carbon-carbon bonds	Accuracy in implementing synthesis strategies through breaking carbon-carbon bonds	<p>Criteria: Based on the assessment rubric that has been created by the teaching lecturer</p> <p>Form of Assessment : Participatory Activities, Project Results Assessment / Product Assessment</p>	Question and answer, discussion, presentation, and case method 2 X 50 minutes	Question and answer, discussion, presentation and case method 2 x 50 minutes	<p>Material: Synthesis strategy through breaking carbon-carbon bonds</p> <p>References: <i>Carruthers, W. & Coldam, I. (2004). Modern Methods of Organic Synthesis. 4th Ed. New York: Cambridge University Press.</i></p>	5%
7	Understand synthesis strategies through breaking carbon-carbon bonds	Accuracy in implementing synthesis strategies through breaking carbon-carbon bonds	<p>Criteria: Based on the assessment rubric that has been created by the teaching lecturer</p> <p>Form of Assessment : Assessment of Project Results / Product Assessment, Practices / Performance</p>	Question and answer, discussion, presentation, and case method 2 X 50 minutes	Question and answer, discussion, presentation and case method 2 x 50 minutes	<p>Material: Synthesis strategy through breaking carbon-carbon bonds</p> <p>References: <i>Carruthers, W. & Coldam, I. (2004). Modern Methods of Organic Synthesis. 4th Ed. New York: Cambridge University Press.</i></p>	5%

8	Mid-term exam to measure final abilities TM-1 to TM-7	Assessment indicators from TM-1 to TM-7	<p>Criteria: Based on the assessment rubric that has been created by the teaching lecturer</p> <p>Form of Assessment : Test</p>	Written test in essay form which is carried out offline 2 x 50 minutes	Essay form written test carried out online 2 x 50 minutes		10%
9	Understand synthesis strategies through breaking down aromatic compounds	Accuracy in implementing synthesis strategies through breaking down aromatic compounds	<p>Criteria: Based on the assessment rubric that has been created by the teaching lecturer</p> <p>Form of Assessment : Project Results Assessment / Product Assessment</p>	Question and answer discussion, presentation and case method 2 X 50 minutes	Question and answer discussion, presentation and case method 2 x 50 minutes	<p>Material: Synthesis strategy through breaking down aromatic compounds</p> <p>References: <i>Tukiran and Suyatno (2018). Organic Chemical Synthesis. Surabaya: Unesa University Press.</i></p>	3%
10	Understand synthesis strategies through breaking down aromatic compounds	Accuracy in implementing synthesis strategies through breaking down aromatic compounds	<p>Criteria: Based on the assessment rubric that has been created by the teaching lecturer</p> <p>Form of Assessment : Project Results Assessment / Product Assessment</p>	Question and answer discussion, presentation and case method 2 X 50 minutes	Question and answer discussion, presentation and case method 2x50 minutes	<p>Material: Synthesis strategy through breaking down aromatic compounds</p> <p>References: <i>Warren, S. & Wyatt, P. (2008). Organic Synthesis: the Disconnection Approach. 2nd Ed. London: John Wiley and Sons, Inc.</i></p>	3%
11	Understand synthesis strategies through breaking down aromatic compounds	Accuracy in implementing synthesis strategies through breaking down aromatic compounds	<p>Criteria: Based on the assessment rubric that has been created by the teaching lecturer</p> <p>Form of Assessment : Assessment of Project Results / Product Assessment, Practices / Performance</p>	Question and answer discussion, presentation and case method 2 X 50 minutes	Question and answer discussion, presentation and case method 2 x 50 minutes	<p>Material: Synthesis strategy through breaking down aromatic compounds</p> <p>References: <i>Carruthers, W. & Coldam, I. (2004). Modern Methods of Organic Synthesis. 4th Ed. New York: Cambridge University Press.</i></p>	4%
12	Students understand the meaning, selection of protective groups, application of protective groups	Accuracy in explaining the meaning, selection of protective groups and application of protective groups in organic synthesis	<p>Criteria: Based on the assessment rubric that has been created by the teaching lecturer</p> <p>Form of Assessment : Assessment of Project Results / Product Assessment, Practices / Performance</p>	Question and answer discussion, presentation and case method 2 X 50 minutes	Question and answer discussion, presentation and case method 2 x 50 minutes	<p>Material: Definition, selection of protective groups and application of protective groups in organic synthesis</p> <p>References: <i>Michael B. Smith, MB & March, J. (2007). March's Advanced Organic Chemistry, Reaction, Mechanism, and Structure, 6th ed. New Jersey: Jonh Wiley and Son, Inc.</i></p>	2%

13	Students understand the meaning, selection of protective groups, application of protective groups,	Accuracy in explaining the meaning, selection of protective groups and application of protective groups in organic synthesis	Criteria: Based on the assessment rubric that has been created by the teaching lecturer Form of Assessment : Participatory Activities, Project Results Assessment / Product Assessment	Question and answer discussion, presentation and case method 2 X 50 minutes	Question and answer discussion, presentation and case method 2 x 50 minutes	Material: Definition, selection of protective groups and application of protective groups in organic synthesis References: <i>Tukiran and Suyatno (2018). Organic Chemical Synthesis. Surabaya: Unesa University Press.</i>	3%
14	Students understand the meaning, selection of protective groups, application of protective groups,	Accuracy in explaining chemoselectivity and stereoselectivity in organic synthesis	Criteria: Based on the assessment rubric that has been created by the teaching lecturer Form of Assessment : Participatory Activities, Project Results Assessment / Product Assessment	Question and answer discussion, presentation and case method 2 X 50 minutes	Question and answer discussion, presentation and case method 2 x 50 minutes	Material: Chemoselectivity and stereoselectivity in organic synthesis References: <i>Warren, S. & Wyatt, P. (2008). Organic Synthesis: the Disconnection Approach. 2nd Ed. London: John Wiley and Sons, Inc.</i>	2%
15	Understanding chemoselectivity and stereoselectivity in organic synthesis	Accuracy in explaining chemoselectivity and stereoselectivity in organic synthesis	Criteria: Based on the assessment rubric that has been created by the teaching lecturer Form of Assessment : Assessment of Project Results / Product Assessment, Practices / Performance	Question and answer discussion, presentation and case method 2 X 50 minutes	Question and answer discussion, presentation and case method 2 x 50 minutes	Material: Chemoselectivity and stereoselectivity in organic synthesis References: <i>Tukiran and Suyatno (2018). Organic Chemical Synthesis. Surabaya: Unesa University Press.</i>	3%
16	Final Semester Examination (UAS) to measure final abilities from TM-9 to TM-15	Assessment indicators TM-9 to TM-15	Criteria: In accordance with the assessment guidelines applicable at Unesa Form of Assessment : Test	Written test in essay form which is carried out offline 2 X 50	Essay form written test carried out online 2 x 50 minutes		20%

Evaluation Percentage Recap: Case Study

No	Evaluation	Percentage
1.	Participatory Activities	10%
2.	Project Results Assessment / Product Assessment	38%
3.	Practice / Performance	12%
4.	Test	40%
		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** 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.