



UNIVERSITAS NEGERI SURABAYA
FACULTY MATHEMATICS AND NATUARAL SCIENCES
UNDERGRADUATE PROGRAM OF CHEMISTRY

**Documen
Code**

LESSON PLAN

COURSE	CODE	COURSE CLASSIFICATION	CREDIT (SKS)		SEMESTER	COMPILATION DATE
Organic Synthesis	3074213055	Compulsory Course	T = 3	P = 0	6	21 June 2021
OTORISASI Undergraduate Program of Chemistry	Lesson Plan Developer Prof. Dr. Suyatno, M.Si.		Course Coordinator Dr. Ismono, M.S.		Coordinator of Study Program Dr. Amaria, M.Si.	
Learning Outcomes	Program Learning Outcomes (PLO)					
	PLO-1	Mastering the concepts of structure, dynamics and energy, as well as the basic principles of separation, analysis, synthesis and characterization of micromolecular compounds and their applications				
	PLO-5	Able to apply logical, critical, systematic and innovative thinking in the context of the development or implementation of science and technology by observe and applying the value of humanities in accordance with the field of chemistry in solving problems				
	Course Learning Outcomes (CLO)					
	CLO-1	Mastering the concept of organic chemical synthesis, the concept of reaction mechanisms, and synthesis strategies of an organic compound				
	CLO-2	Able to apply synthesis strategies to design the synthesis of an organic compound.				
	CLO-3	Able to make appropriate decisions in the context of solving problems based on the results of analysis of information and data needed in the synthesis of organic compound.				
	CLO-4	Have a responsible attitude and can work together with a team in completing tasks and be able to communicate both orally and in writing in explaining the role of synthesis in everyday life and industry.				
	The Final ability of each learning stage (Sub-CLO)					
	Sub-CLO1	Understand the meaning, use, principles of organic chemical synthesis				
Sub-CLO2	Understand the types of organic reactions, functional group functionalization processes, functional group interconversion					
Sub-CLO3	Understand about the types of organic reactions for the formation of carbon skeletons					

	Sub-CLO4	Understand the basic principles in designing the synthesis of organic compounds			
	Sub-CLO5	Understand the synthesis strategy through the disconnection of carbon-heteroatom bonds			
	Sub-CLO6	Understand the synthesis strategy through the disconnection of carbon-carbon bonds			
	Sub-CLO7	Understand the synthesis strategy through the disconnection of aromatic compounds			
	Sub-CLO8	Understand about Definition, selection of protective groups and application of protective groups in organic synthesis			
	Sub-CLO9	Understand about chemoselectivity and stereoselectivity in organic synthesis			
Description of Course	The study of functionalization of functional group, functional group interconversion, formation of carbon-carbon bond and carbon-heteroatom bond, target molecule, retrosynthetic and disconnection approach, synthesis strategy, protective group, chemoselective and stereoselective reaction.				
Course material	<ol style="list-style-type: none"> 1. The meaning, use, principles of organic chemical synthesis 2. The types of organic reactions, functional group functionalization processes, functional group interconversion 3. The types of organic reactions for the formation of carbon skeletons 4. The basic principles in designing the synthesis of organic compounds 5. The synthesis strategy through the disconnection of carbon-heteroatom bonds 6. The synthesis strategy through the disconnection of carbon-carbon bonds 7. The synthesis strategy through the disconnection of aromatic compounds 8. Protective groups in organic synthesis 9. Chemoselectivity and stereoselectivity in organic synthesis 				
References	Main References :				
	<ol style="list-style-type: none"> 1. Carruthers, W. & Coldham, 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. 				
	Supporting References :				
	<ol style="list-style-type: none"> 5. Fessenden, R.J. dan Fessenden, J.S. (1998). <i>Kimia Organik</i>. Jilid 1 dan 2. Penerjemah AH Pudjaatmaka. Jakarta: Erlangga. 6. Solomon, T.W.G. & Fryhle, C.B. (2011). <i>Organic Chemistry</i>. New York: John Wiley & Sons, Inc. 				
Lecturer	<ol style="list-style-type: none"> 1. Prof. Dr. Suyatno, M.Si. 2. Prof. Dr. Tukiran, M.Si. 				
Prerequisite Course	Monofunctional Organic Compound and Polyfunctional of Organic Compound				
Meeting	The Final ability of each learning stage (Sub-CLO)	Evaluation	Form of Learning, Learning Models/ Methods, Assignment [Time Estimate]	Learning Materials [Reference]	Weight score of

		Indicator	Criteria & Form	Offline	Online		evaluation (%)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	Understand the meaning, use, principles of organic chemical synthesis	Explain the meaning, use, principles of organic chemical synthesis	Criteria: - The suitability of the answers with the scoring rubric for each indicator Evaluation type: Essay test	Form of learning: Lecture Learning model: Direct instruction	-	The meaning, use, principles of organic chemical synthesis (Reference 3)	10
2	Understand the types of organic reactions, functional group functionalization processes, functional group interconversion	Explain the types of organic reactions, functional group functionalization processes, functional group interconversion	Criteria: - The suitability of the answers with the scoring rubric for each indicator Evaluation type: Essay test	Form of learning: Lecture Learning model: Problem based learning	-	The types of organic reactions, functional group functionalization processes, functional group interconversion (Reference 2, 3, and 5)	10
3	Understand about the types of organic reactions for the formation of carbon skeletons	Explain the types of organic reactions for the formation of carbon skeletons	Criteria: - The suitability of the answers with the scoring rubric for each indicator Evaluation type: Essay test	Form of learning: Lecture Learning model: Problem based learning		The types of organic reactions for the formation of carbon skeletons (Reference 1, 3 and 4)	10
4	Understand the basic principles in designing the synthesis of organic compounds	Explain the basic principles in designing the synthesis of organic compounds	Criteria: - The suitability of the answers with the scoring rubric for each indicator	Form of learning: Lecture Learning model: Problem based learning		The basic principles in designing the synthesis of organic	10

			Evaluation type: Essay test			(Reference 1, 3 and 4)	
5	Understand the synthesis strategy through the disconnection of carbon-heteroatom bonds	Explain the synthesis strategy through the disconnection of carbon-heteroatom bonds	Criteria: - The suitability of the answers with the scoring rubric for each indicator Evaluation type: Essay test	Form of learning: Lecture Learning model: Problem based learning		The synthesis strategy through the disconnection of carbon-heteroatom bonds (Reference 1, 3 and 4)	15
6-7	Understand the synthesis strategy through the disconnection of carbon-carbon bonds	Explain the synthesis strategy through the disconnection of carbon-carbon bonds	Criteria: - The suitability of the answers with the scoring rubric for each indicator Evaluation type: Essay test	Form of learning: Lecture Learning model: Problem based learning	-	The synthesis strategy through the disconnection of carbon-heteroatom bonds (Reference 1, 3 and 4)	15
8	The Midterm exam						
9-11	Understand the synthesis strategy through the disconnection of aromatic compounds	Explain the synthesis strategy through the disconnection of aromatic compounds	Criteria: - The suitability of the answers with the scoring rubric for each indicator Evaluation type: Essay test	Form of learning: Lecture Learning model: Problem based learning	-	The synthesis strategy through the disconnection of aromatic compounds (Reference 3, 4, and 6)	10
12-13	Understand about Definition, selection of protective groups and application of protective groups in organic synthesis	Explain definition, selection of protective groups and application of protective	Criteria: - The suitability of the answers with the scoring rubric for each indicator - Evaluation type: Essay test	Form of learning: Lecture Learning model: Problem based learning	-	Protective groups in organic synthesis (Reference 1,3, 4, and 6)	10

		groups in organic synthesis					
14-15	Understand about chemoselectivity and stereoselectivity in organic synthesis	Explain the chemoselectivity and stereoselectivity in organic synthesis	Criteria: - The suitability of the answers with the scoring rubric for each indicator Evaluation type: Essay test	Form of learning: Lecture Learning model: Problem based learning	-	Chemoselectivity and stereoselectivity in organic synthesis (Reference 1, 3, 4, and 5)	10
16	The Final Exam						100

Notes :

1. **Graduate Learning Outcome of Study Program (CPL-Study Program)** is the ability possessed by each PRODI graduate which is the internalization of attitudes, mastery of knowledge and skills in accordance with the level of the study program obtained through the learning process
2. **CPL which is charge on the course** are some of the learning outcomes of the study program graduates (CPL-PRODI) which are used for the formation / development of a course which consists of aspects of attitude, general skills, special skills and knowledge.
3. **Course Learning Outcome (CLO)** is the ability that is described specifically from the CPL that is charged to the course, and is specific to the study material or learning material of the course
4. **Sub- Course Learning Outcome (Sub-CLO)** is an ability that is described specifically from the CPMK that can be measured or observed and is the final ability planned at each learning stage, and is specific to the learning material of the course.
5. **Evaluation indicator** is ability in the process and student learning outcomes is a specific and measurable statement that identifies the ability or performance of student learning outcomes accompanied by evidence.
6. **Evaluation criteria** is a benchmark that is used as a measure or measure of learning achievement in an assessment based on predetermined indicators. Assessment criteria are guidelines for assessors so that the assessment is consistent and unbiased. The criteria can be either quantitative or qualitative
7. **Type of evaluation:** test and non-test.
8. **Learning Form:** 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 Method:** Small Group Discussion, Role-Play & Simulation, Discovery Learning, Self-Directed Learning, Cooperative Learning, Collaborative Learning, Contextual Learning, Project Based Learning, and another equivalent method
10. **Learning Material** is details or descriptions of the study material which can be presented in the form of several subjects and sub-topics

11. **Weight Score of Evaluation** is the percentage of assessment of each sub-CLO achievement which is proportional to the difficulty level of achieving the sub-CLO , and the total is 100%.
12. TM= Meeting , PT=Structured assignment , BM= Independent Learning.