



<b>Short Course Description</b>	This course examines bond energy, bond length and dipole moment in organic compounds and the influencing factors, effects that influence the reactivity of organic compounds, Hammett's equation and Taft's equation, mechanisms of nucleophilic substitution reactions, electrophilic substitution reactions, elimination reactions, addition reactions. electrophilic, nucleophilic addition reactions, condensation reactions and rearrangement reactions.						
<b>References</b>	<b>Main :</b>						
	<ol style="list-style-type: none"> <li>1. Ismono, Suyatno, Tukiran (2018). Kimia Organik Lanjut: Mekanisme Reaksi Organik. Surabaya: Unesa University Press</li> <li>2. Smith, M.B. and March, J. (2007) March's Advanced Organic Chemistry, Reaction, Mechanism, and Structure, 6th edition, New York: John Wiley and Son, Inc</li> <li>3. Smith, J.G. (2011). Organic Chemistry. New York: Mc Graw-Hill Companies, Inc.</li> <li>4. Fessenden RJ and JS. Fessenden (1994) Kimia Organik Jilid 1 dan 2, Edisi ketiga, Alih bahasa Oleh A Hadyana Pudjaatmaka, Jakarta: Erlangga.</li> <li>5. Solomon, T.W.G. &amp; Fryhle, C.B. (2011). Organic Chemistry. New York: John Wiley &amp; Sons, Inc</li> </ol>						
	<b>Supporters:</b>						
<ol style="list-style-type: none"> <li>1. Robert V, Hoffman, 2004, Organic Chemistry, an Intermediate Text, Second Addition, Canada, John Wiley and Sons. Inc. Publications</li> <li>2. Carey, F.A. ( 2000. ). Organic Chemistry</li> </ol>							
<b>Supporting lecturer</b>	Prof. Dr. Suyatno, M.Si. Prof. Dr. Tukiran, M.Si. Dr. Ratih Dewi Saputri, S.Si., 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	Able to analyze the magnitude of bond energy, bond length and dipole moment in organic compounds and the influencing factors	<ol style="list-style-type: none"> <li>1.1. Determine the bond energy in organic compounds</li> <li>2.2. Determine the bond length in organic compounds</li> </ol>	<b>Criteria:</b> essay test 25% while summative and performance assessment 75%  <b>Form of Assessment :</b> Participatory Activities	Method: Question and Answer and discussion 2x50 minutes		<b>Material:</b> bond energy and bond length <b>References:</b> 1. Ismono, Suyatno, Tukiran (2018). <i>Advanced Organic Chemistry: Mechanisms of Organic Reactions.</i> Surabaya: Unesa University Press <hr/> <b>Material:</b> bond energy <b>Bibliography:</b> Robert V, Hoffman, 2004, <i>Organic Chemistry, an Intermediate Text, Second Addition,</i> Canada, John Wiley and Sons. Inc. Publications	5%

2	Able to analyze the magnitude of bond energy, bond length and dipole moment in organic compounds and the influencing factors	<ol style="list-style-type: none"> <li>1. Determine the dipole moment in organic compounds</li> <li>2. Analyze the factors that influence the magnitude of bond energies, bond lengths and dipole moments in organic compounds</li> </ol>	<p><b>Criteria:</b> essay test 25% while summative and performance assessment 75%</p> <p><b>Form of Assessment :</b> Participatory Activities, Tests</p>	<p>Method: Discussion, question and answer, problem solving, and assignment Model: case method 2x50 minutes</p>	<p>Method: Discussion, question and answer, problem solving, and assignment Model: case method 2x50 minutes</p>	<p><b>Material:</b> bond energy and bond length <b>References:</b> 1. <i>Ismono, Suyatno, Tukiran (2018). Advanced Organic Chemistry: Mechanisms of Organic Reactions. Surabaya: Unesa University Press</i></p> <hr/> <p><b>Material:</b> bond energy <b>Bibliography:</b> <i>Robert V, Hoffman, 2004, Organic Chemistry, an Intermediate Text, Second Addition, Canada, John Wiley and Sons. Inc. Publications</i></p>	10%
3	Able to analyze factors that influence the reactivity of organic compounds	<ol style="list-style-type: none"> <li>1.1. Explain the influence of the induction effect on the creativity of organic compounds</li> <li>2.2. Explain the influence of the resonance effect on the creativity of organic compounds</li> <li>3.3. Explain the influence of the hyperconjugation effect on the creativity of organic compounds</li> </ol>	<p><b>Criteria:</b> essay test 25% while summative and performance assessment 75%</p> <p><b>Form of Assessment :</b> Participatory Activities, Tests</p>	<p>Method: Discussion, question and answer, problem solving, assignments 2 x 50 minutes</p>	<p>Method: Discussion, question and answer, problem solving, assignments 2 x 50 minutes</p>	<p><b>Material:</b> compound reactivity in terms of induction, resonance, and hyperconjugation effects. <b>References:</b> 2. <i>Smith, MB and March, J. (2007) March's Advanced Organic Chemistry, Reaction, Mechanism, and Structure, 6th edition, New York: John Wiley and Son, Inc</i></p> <hr/> <p><b>Material:</b> compound reactivity in terms of induction, resonance and hyperconjugation effects. <b>Reference:</b> <i>Carey, FA (2000). Organic Chemistry</i></p>	5%

4	Able to analyze factors that influence the reactivity of organic compounds	<p>1.Explain the influence of steric effects on the creativity of organic compounds</p> <p>2.Explain the effect of hydrogen bonds on the creativity of organic compounds</p>	<p><b>Criteria:</b> essay test 25% while summative and performance assessment 75%</p> <p><b>Form of Assessment :</b> Participatory Activities, Tests</p>	Model: case method 2 x 50 minutes	Model: case method 2 x 50 minutes	<p><b>Material:</b> compound reactivity in terms of induction, resonance, and hyperconjugation effects.</p> <p><b>References:</b> 2. Smith, MB and March, J. (2007) <i>March's Advanced Organic Chemistry, Reaction, Mechanism, and Structure, 6th edition, New York: John Wiley and Son, Inc</i></p> <hr/> <p><b>Material:</b> compound reactivity in terms of induction, resonance and hyperconjugation effects.</p> <p><b>Reference:</b> Carey, FA (2000). <i>Organic Chemistry</i></p>	10%
5	Be able to apply the Hammett and Taft equation to explain the reactivity of organic compounds	<p>1.1. Apply Hammett's equation to explain the reactivity of organic compounds</p> <p>2.2. Apply the Taft equation to explain the reactivity of organic compounds</p>	<p><b>Criteria:</b> essay test 25% while summative and performance assessment 75%</p> <p><b>Form of Assessment :</b> Participatory Activities</p>	Method: Discussion, question and answer, problem solving, assignment Model: case method	Method: Discussion, question and answer, problem solving, assignment Model: case method	<p><b>Material:</b> Hammett and Taft equation</p> <p><b>References:</b> 1. Ismono, Suyatno, Tukiran (2018). <i>Advanced Organic Chemistry: Mechanisms of Organic Reactions. Surabaya: Unesa University Press</i></p> <hr/> <p><b>Material:</b> Hammett and Taft equation</p> <p><b>Bibliography:</b> 2. Smith, MB and March, J. (2007) <i>March's Advanced Organic Chemistry, Reaction, Mechanism, and Structure, 6th edition, New York: John Wiley and Son, Inc</i></p>	10%

6	Able to understand the mechanism of nucleophilic substitution reactions and electrophilic substitution reactions	1.1. Explain the mechanism of the nucleophilic substitution reaction SN-1 and SN-2. 2.2. Explain the mechanism of electrophilic substitution reactions	<b>Criteria:</b> essay test 25% while summative and performance assessment 75%  <b>Form of Assessment :</b> Participatory Activities, Tests	Method: Discussion, question and answer, problem solving, assignment	Method: Discussion, question and answer, problem solving, assignment	<b>Material:</b> electrophilic and nucleophilic substitution <b>References:</b> 4. Fessenden RJ and JS. Fessenden (1994) <i>Organic Chemistry Volumes 1 and 2, Third Edition, Translated by A Hadyana Pudjaatmaka, Jakarta: Erlangga.</i>  <b>Material:</b> SN1, SN2, E1, and E2 reactions <b>References:</b> Solomon, TWG & Fryhle, CB (2011). <i>Organic Chemistry. New York: John Wiley &amp; Sons, Inc</i>	5%
7	Able to understand the mechanism of nucleophilic substitution reactions and electrophilic substitution reactions	1.1. Explain the mechanism of the nucleophilic substitution reaction SN-1 and SN-2. 2.2. Explain the mechanism of electrophilic substitution reactions	<b>Criteria:</b> essay test 25% while summative and performance assessment 75%  <b>Form of Assessment :</b> Participatory Activities, Tests	Model: case method	Model: case method	<b>Material:</b> electrophilic and nucleophilic substitution <b>References:</b> 4. Fessenden RJ and JS. Fessenden (1994) <i>Organic Chemistry Volumes 1 and 2, Third Edition, Translated by A Hadyana Pudjaatmaka, Jakarta: Erlangga.</i>  <b>Material:</b> SN1, SN2, E1, and E2 reactions <b>References:</b> Solomon, TWG & Fryhle, CB (2011). <i>Organic Chemistry. New York: John Wiley &amp; Sons, Inc</i>	10%

8	Mid-Semester Exam to assess the achievement of Final Skills from TM 1 to 7	MATERIALS 1-7	<p><b>Criteria:</b> Based on the assessment rubric that has been created by the teaching lecturer.</p> <p><b>Form of Assessment :</b> Participatory Activities</p>	<p>Method: Discussion, question and answer, problem solving, assignment</p> <p>Model: case method 2 x 50 minutes</p>	<p>Method: Discussion, question and answer, problem solving, assignment</p> <p>Model: case method 2 x 50 minutes</p>	<p><b>Material:</b> material 1-7 <b>Bibliography:</b> 2. Smith, MB and March, J. (2007) <i>March's Advanced Organic Chemistry, Reaction, Mechanism, and Structure, 6th edition, New York: John Wiley and Son, Inc</i></p> <hr/> <p><b>Material:</b> material 1-7 <b>References:</b> 3. Smith, JG (2011). <i>Organic Chemistry, New York: Mc Graw-Hill Companies, Inc.</i></p> <hr/> <p><b>Material:</b> material 1-7 <b>References:</b> 4. Fessenden RJ and JS. <i>Fessenden (1994) Organic Chemistry Volumes 1 and 2, Third Edition, Translated by A Hadyana Pudjaatmaka, Jakarta: Erlangga.</i></p> <hr/> <p><b>Material:</b> material 1-7 <b>Bibliography:</b> Robert V, Hoffman, 2004, <i>Organic Chemistry, an Intermediate Text, Second Addition, Canada, John Wiley and Sons. Inc. Publications</i></p>	0%
9	Able to understand the mechanisms of elimination reactions and competing reactions between nucleophilic substitution reactions and elimination reactions	<p>1.Explain the mechanism of the elimination reactions E-1 and E-2</p> <p>2.Analyze competing reactions between nucleophilic substitution reactions and elimination reactions</p>	<p><b>Criteria:</b> essay test 25% while summative and performance assessment 75%</p> <p><b>Form of Assessment :</b> Participatory Activities</p>	<p>Method: Discussion, question and answer, problem solving, assignment</p> <p>Model: case method 2X50 minutes</p>	<p>Method: Discussion, question and answer, problem solving, assignment</p> <p>Model: case method</p>	<p><b>Material:</b> advanced reactions of substitution and elimination <b>References:</b> 4. Fessenden RJ and JS. <i>Fessenden (1994) Organic Chemistry Volumes 1 and 2, Third Edition, Translated by A Hadyana Pudjaatmaka, Jakarta: Erlangga.</i></p> <hr/> <p><b>Material:</b> SN and Elimination <b>Bibliography:</b> Robert V, Hoffman, 2004, <i>Organic Chemistry, an Intermediate Text, Second Addition, Canada, John Wiley and Sons. Inc. Publications</i></p>	10%

10	Able to understand the mechanism of electrophilic addition reactions and nucleophilic addition reactions	<ol style="list-style-type: none"> <li>1.Explain the mechanism of electrophilic addition reactions</li> <li>2.Explain the mechanism of nucleophilic addition reactions</li> </ol>	<p><b>Criteria:</b> essay test 25% while summative and performance assessment 75%</p> <p><b>Form of Assessment :</b> Participatory Activities</p>	<p>Method: Discussion, question and answer, problem solving, assignment</p>	<p>Method: Discussion, question and answer, problem solving, assignment</p>	<p><b>Material:</b> electrophilic addition and nucleophilic addition</p> <p><b>References:</b> 1. Ismono, Suyatno, Tukiran (2018). <i>Advanced Organic Chemistry: Mechanisms of Organic Reactions.</i> Surabaya: Unesa University Press</p> <hr/> <p><b>Material:</b> additional</p> <p><b>Bibliography:</b> 2. Smith, MB and March, J. (2007) <i>March's Advanced Organic Chemistry, Reaction, Mechanism, and Structure, 6th edition, New York: John Wiley and Son, Inc</i></p>	5%
11	Able to understand the mechanism of electrophilic addition reactions and nucleophilic addition reactions	<ol style="list-style-type: none"> <li>1.Explain the mechanism of electrophilic addition reactions</li> <li>2.Explain the mechanism of nucleophilic addition reactions</li> </ol>	<p><b>Criteria:</b> essay test 25% while summative and performance assessment 75%</p> <p><b>Form of Assessment :</b> Participatory Activities, Tests</p>	<p>Method: Discussion, question and answer, problem solving, assignment</p>	<p>Method: Discussion, question and answer, problem solving, assignment</p>	<p><b>Material:</b> electrophilic addition and nucleophilic addition</p> <p><b>References:</b> 1. Ismono, Suyatno, Tukiran (2018). <i>Advanced Organic Chemistry: Mechanisms of Organic Reactions.</i> Surabaya: Unesa University Press</p> <hr/> <p><b>Material:</b> additional</p> <p><b>Bibliography:</b> 2. Smith, MB and March, J. (2007) <i>March's Advanced Organic Chemistry, Reaction, Mechanism, and Structure, 6th edition, New York: John Wiley and Son, Inc</i></p>	10%
12	Able to understand the mechanism of the condensation reaction of organic compounds	<ol style="list-style-type: none"> <li>1.1. Explain the mechanism of the aldol condensation reaction</li> <li>2.2. Explain the mechanism of the Claisen condensation reaction</li> <li>3.3. Explain the mechanism of the Knoevenagel condensation reaction</li> <li>4.4. Explain the mechanism of the Cannizzaro reaction</li> </ol>	<p><b>Criteria:</b> essay test 25% while summative and performance assessment 75%</p> <p><b>Form of Assessment :</b> Test</p>	<p>Method: Discussion, question and answer, problem solving, assignment</p> <p>Model: case method 2 x 50 minutes</p>	<p>Method: Discussion, question and answer, problem solving, assignment</p> <p>Model: case method 2 x 50 minutes</p>	<p><b>Material:</b> various condensation reactions</p> <p><b>References:</b> 3. Smith, JG (2011). <i>Organic Chemistry. New York: Mc Graw-Hill Companies, Inc.</i></p> <hr/> <p><b>Material:</b> types of condensation reactions</p> <p><b>References:</b> Solomon, TWG &amp; Fryhle, CB (2011). <i>Organic Chemistry. New York: John Wiley &amp; Sons, Inc</i></p>	5%

13	Able to understand the mechanism of the condensation reaction of organic compounds	<ol style="list-style-type: none"> <li>1.1. Explain the mechanism of the aldol condensation reaction</li> <li>2.2. Explain the mechanism of the Claisen condensation reaction</li> <li>3.3. Explain the mechanism of the Knoevenagel condensation reaction</li> <li>4.4. Explain the mechanism of the Cannizzaro reaction</li> </ol>	<p><b>Criteria:</b> essay test 25% while summative and performance assessment 75%</p> <p><b>Form of Assessment :</b> Test</p>	<p>Method: Discussion, question and answer, problem solving, assignment</p> <p>Model: case method 2 x 50 minutes</p>	<p>Method: Discussion, question and answer, problem solving, assignment</p> <p>Model: case method 2 x 50 minutes</p>	<p><b>Material:</b> various condensation reactions <b>References:</b> 3. Smith, JG (2011). <i>Organic Chemistry</i>. New York: Mc Graw-Hill Companies, Inc.</p> <hr/> <p><b>Material:</b> types of condensation reactions <b>References:</b> Solomon, TWG &amp; Fryhle, CB (2011). <i>Organic Chemistry</i>. New York: John Wiley &amp; Sons, Inc</p>	5%
14	Able to understand the mechanism of organic compound rearrangement reactions	<ol style="list-style-type: none"> <li>1.Explain the mechanism of rearrangement reactions in electron-deficient carbon atoms (carbocations)</li> <li>2.Explain the mechanism of rearrangement reactions in electron-neutral nitrogen atoms</li> </ol>	<p><b>Criteria:</b> essay test 25% while summative and performance assessment 75%</p> <p><b>Form of Assessment :</b> Test</p>	<p>Method: Discussion, question and answer, problem solving, assignment</p> <p>Model: case method 2 x 50 minutes</p>	<p>Method: Discussion, question and answer, problem solving, assignment</p> <p>Model: case method 2 x 50 minutes</p>	<p><b>Material:</b> Rearrangement reaction mechanisms in electron-neutral carbon atoms (carbocations) <b>References:</b> 3. Smith, JG (2011). <i>Organic Chemistry</i>. New York: Mc Graw-Hill Companies, Inc.</p> <hr/> <p><b>Material:</b> Mechanism of rearrangement reactions in electron-neutral carbon atoms (carbocations). <b>References:</b> Robert V, Hoffman, 2004, <i>Organic Chemistry, an Intermediate Text, Second Addition, Canada, John Wiley and Sons. Inc. Publications</i></p>	5%
15	Able to understand the mechanism of organic compound rearrangement reactions	<ol style="list-style-type: none"> <li>1.Explain the mechanism of rearrangement reactions in electron-deficient carbon atoms (carbocations)</li> <li>2.Explain the mechanism of rearrangement reactions in electron-neutral nitrogen atoms</li> </ol>	<p><b>Criteria:</b> essay test 25% while summative and performance assessment 75%</p> <p><b>Form of Assessment :</b> Participatory Activities, Tests</p>	<p>Method: Discussion, question and answer, problem solving, assignment</p> <p>Model: case method 2 x 50 minutes</p>	<p>Method: Discussion, question and answer, problem solving, assignment</p> <p>Model: case method 2 x 50 minutes</p>	<p><b>Material:</b> Rearrangement reaction mechanisms in electron-neutral carbon atoms (carbocations) <b>References:</b> 3. Smith, JG (2011). <i>Organic Chemistry</i>. New York: Mc Graw-Hill Companies, Inc.</p> <hr/> <p><b>Material:</b> Mechanism of rearrangement reactions in electron-neutral carbon atoms (carbocations). <b>References:</b> Robert V, Hoffman, 2004, <i>Organic Chemistry, an Intermediate Text, Second Addition, Canada, John Wiley and Sons. Inc. Publications</i></p>	5%

16	Final Semester Examination to assess the achievement of Final Skills from TM 9 to 15	MATERIALS 9-15	<p><b>Criteria:</b> Based on the assessment rubric that has been created by the teaching lecturer.</p> <p><b>Form of Assessment :</b> Test</p>			<p><b>Material:</b> material 9-15 <b>Bibliography:</b> 2. Smith, MB and March, J. (2007) March's <i>Advanced Organic Chemistry, Reaction, Mechanism, and Structure</i>, 6th edition, New York: John Wiley and Son, Inc</p> <p>-----</p> <p><b>Material:</b> material 9-15 <b>References:</b> 3. Smith, JG (2011). <i>Organic Chemistry</i>. New York: Mc Graw-Hill Companies, Inc.</p> <p>-----</p> <p><b>Material:</b> material 9-15 <b>References:</b> Carey, FA (2000.). <i>Organic Chemistry</i></p> <p>-----</p> <p><b>Material:</b> material 9-15 <b>References:</b> 1. Ismono, Suyatno, Tukiran (2018). <i>Advanced Organic Chemistry: Mechanisms of Organic Reactions</i>. Surabaya: Unesa University Press</p> <p>-----</p> <p><b>Material:</b> material 9-15 <b>References:</b> 4. Fessenden RJ and JS. Fessenden (1994) <i>Organic Chemistry Volumes 1 and 2, Third Edition</i>, Translated by A Hadyana Pudjaatmaka, Jakarta: Erlangga.</p>	0%
----	--	----------------	--	--	--	---	----

#### Evaluation Percentage Recap: Project Based Learning

No	Evaluation	Percentage
1.	Participatory Activities	57.5%
2.	Test	42.5%
		100%

#### 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.
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.