

# SEMESTER COURSE PLAN (SLP)

**BIOCHEMISTRY COUSE  
(23101110503)**



## **TEACHING TEAM :**

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**BACHELOR PROGRAMME IN ANIMAL HUSBANDRY  
FACULTY OF ANIMAL SCIENCE  
HASANUDDIN UNIVERSITY  
MAKASSAR  
2025**

**BACHELOR PROGRAMME IN ANIMAL HUSBANDRY  
FACULTY OF ANIMAL SCIENCE  
HASANUDDIN UNIVERSITY**

**Vision**

Vision of the study program :

Becoming an international standard in livestock education provider based on the Indonesian Maritime Continent

**Vision Strategic**

In accordance with the vision, mission, and objectives that have been set, the Animal Husbandry Study Program of the Faculty of Animal Science sets the following objectives to be achieved:

- a. Improving the quality of learning implementation that is in line with the needs of industry and society based on research and international standards;
- b. Creating networks and partnerships in the development of Animal Husbandry science and technology and its utilization in the implementation of learning;
- c. Producing graduates who have character, vision, creativity and innovation in the field of animal husbandry science and technology with an entrepreneurial perspective.

**Mission**

The mission carried out in the implementation of the Bachelor of Animal Husbandry Study Program, Faculty of Animal Husbandry, Hasanuddin University is

- 1) Organizing quality learning to produce independent and globally competitive Animal Husbandry scholars.
- 2) Developing animal husbandry science for the benefit of the nation.
- 3) Providing a conducive academic climate for implementing education with an entrepreneurial perspective.

**Graduate Profiles**

No	Profile	Description
1	Manager	Graduates who apply concepts and techniques in managing livestock farming and institutions related to livestock businesses such as financial institutions
2	Young Researcher	Graduates who able to apply scientific concepts and methods in solving problems in the development of the field of Animal Husbandry
3	Planners	Graduates who able to prepare potential and problem analysis, as well as formulate plans and strategies for the development of the livestock and related industries
4	Educators	Graduates who have the ability and skills to transfer science and technology to students in the field of animal husbandry
5	Entrepreneur	Graduates who able to apply business in the field of Animal Husbandry as their main business, or business development to support livestock business
6	Bureaucrat	Graduates who are able to organize government duties, especially in the affairs of livestock development

### **Learning Outcomes imposed on the Course**

ILO-3 (P2) - Mastering the concept and solving livestock problems based on data, science, and scientific methods (K-02).

ILO-4 (KU1) - Able to apply logical, critical, systematic, and innovative thinking in the context of developing or implementing information technology-based science and technology (GS-01).

### **Course Learning Outcomes (CLO)**

CLO-1: : Able to analyze cell organization, enzymes and enzyme kinetics and biochemistry of photosynthesis (SLO3) CLO-2: Able to analyze lipid, carbohydrate, protein, vitamin and mineral metabolism (SLO4)

### **Sub-CLO**

Sub-CLO-1: Able to analyze SLP and material on cell organization and function ()

Sub-CLO-2: Able to analyze the concept of enzymes, enzyme kinetics and digestive enzymes () Sub-

Sub-CLO-3: Able to analyze the process of photosynthesis and chemosynthesis in plants ()

Sub-CLO-4: Able to analyze the structure, type and function of nucleic acids and protein metabolism ()

Sub-CLO-5: Able to analyze the process of carbohydrate metabolism ()

Sub-CLO-6: Able to analyze the process of fat metabolism ()

Sub-CLO-7: Able to analyze the benefits of water in the metabolic process ()

Sub-CLO-8: Able to analyze the benefits of vitamins in the metabolic process ()

Sub-CLO-9: Able to analyze the benefits of minerals in the metabolic process ()

## Learning Analysis

Animal Husbandry Biochemistry



Able to analyze the benefits of minerals in the metabolic process ()



Able to analyze the benefits of vitamins in the metabolic process ()



Able to analyze the benefits of water in the metabolic process ()



Able to analyze the process of fat metabolism ()



Able to analyze the process of carbohydrate metabolism ()



Able to analyze the process of photosynthesis and chemosynthesis in plants ()



Able to analyze the concept of enzymes, enzyme kinetics and digestive enzymes ()

Able to analyze SLP and material on cell organization and its functions ()

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**HASANUDDIN UNIVERSITY  
FACULTY OF ANIMAL SCIENCE  
BACHELOR PROGRAMME IN ANIMAL HUSBANDRY  
SEMESTER COURSE PLAN**

Course	Code	Course Group	Credits Points	Semester	Date of Preparation
Biochemistry	23101110503		3	1	October 10, 2023
<b>Authority</b>	<b>Developer Lecturer</b>		<b>Course Coordinator</b>		<b>Head of study Program</b>
	Prof. Dr. Ir. Asmuddin Natsir, M.Sc., Dr. Ir. Syahriani, M.Si., Dr. A. Mujnisa, S.Pt., MP., Prof.Dr. Ir. Sri Purwanti, S.Pt., M.Si., IPU, ASEAN Eng., Prof. Dr. Ir. Muhammad Irfan Said, S.Pt., MP., IPM, ASEAN Eng., Marhamah Nadir, S.P., M.Si., Ph.D., Abdul Alim Yamin, S.Pt, M.Si, Ismah Ulfiyah Azis,S.Pt., M.Sc.		Dr. Ir. Syahriani, M.Si..		Dr. Agr. Ir. Renny Fatmyah Utamy, S. Pt., M. Agr., IPM
<b>Course Learning Outcomes</b>	<b>ILOs that are imposed on the course</b>				
	<b>ILO-7</b>	Mastering the concept and solving livestock problems based on data, science, and scientific methods (K-02).			
	<b>ILO-8</b>	Able to apply logical, critical, systematic, and innovative thinking in the context of developing or implementing information technology-based science and technology (GS-01).			
	<b>ILO⇒ Course Learning Outcomes (CLO)</b>				
	After completing this course, it is expected:				
	<b>ILO-7</b>	ILO-1: Able to analyze cell organization, enzymes and enzyme kinetics and photosynthesis biochemistry.			
	<b>ILO-8</b>	CLO-2 : Able to analyze lipid, carbohydrate, protein, vitamin and mineral metabolism			

<b>CLO 1</b>	Sub-CLO-1: Able to analyze SLP and material on cell organization and function ()
	Sub-CLO 2: Able to analyze the concept of enzymes, enzyme kinetics and digestive enzymes ()
	Sub- CLO 3: Able to analyze the process of photosynthesis and chemosynthesis in plants ()
	Sub-CLO 4: Able to analyze the structure, type and function of nucleic acids and protein metabolism ()
	Sub CLO-5: Able to analyze the process of carbohydrate metabolism ()
	Sub-CLO 6: Able to analyze the process of fat metabolism ()
	Sub CLO-7: Able to analyze the benefits of water in the metabolic process ()
	Sub CLO-8: Able to analyze the benefits of vitamins in the metabolic process ()
	Sub CLO-9: Able to analyze the benefits of minerals in the metabolic process ()

**Correlation between ILOs/CLOs to Sub-CLOs**

ILOs that are imposed on the course	ILO	SUB CLO	Form Assessment+				Weight	Value	Student Score
			Formative	Summative					
				Practicum/Field Practice Case Study	Quiz	Problem Base Learning			
ILO	SLOS-	SUB-CLO 2	Attendance, active discussion, submitting independent assignments.	5	2.5	0	0	7.5	
ILO	CLO-	SUB-CLO 3	Attendance, active discussion, submitting independent assignments.	5	5	0	0	7.5	
ILO	CLO-	SUB-CLO 4	Attendance, active discussion, submitting independent assignments.	5	5	5	0	15	
ILO	CLO-	SUB-CLO- 5	Attendance, active discussion, submitting independent assignments.	5	5	0	5	15	
ILO	CLO-	SUB-CLO 6	Attendance, active discussion, submitting independent assignments.	5	5	0	5	15	
ILO	CLO-	SUB-CLO- 7	Attendance, active discussion, submitting independent assignments.	0	2.5	0	5	15	
ILO	SLOS-	SUB-CLO- 8	Attendance, active discussion, submitting independent assignments.	0	5	0	2.5	5	
ILO	CLO-	SUB-CLO- 9	Attendance, active discussion, submitting independent assignments.	0	5	0	5	10	

		Attendance, active discussion, submitting independent assignments.	5	5	0	5	10		
			25	37.5	5	32.5	100		
<b>Course Description</b>	The livestock biochemistry course discusses cell organization and function, enzymes and enzyme kinetics, protein structure and metabolism, including: protein catabolism and synthesis, structure, type and function of nucleic acids, biochemistry of photosynthesis and chemosynthesis, structure and classification of carbohydrates, carbohydrate metabolism, including: glycolysis, citric acid cycle, electron transport system, glycogenesis, gluconeogenesis, structure and classification of lipids, lipid metabolism, including: lipolysis, lipogenesis, water function in metabolic processes, vitamin metabolism and absorption, metabolism and excretion of minerals.								
<b>Learning Materials / Subject Matter</b>	<ol style="list-style-type: none"> <li>1. Cell organization and function, enzymes and enzyme kinetics, biochemistry of photosynthesis and chemosynthesis</li> <li>2. Metabolism of lipids, carbohydrates, proteins, vitamins and minerals</li> </ol>								
<b>Reference</b>	<b>Key Reference</b>								
	<ol style="list-style-type: none"> <li>1. Lehninger. 1999. <i>Dasar-Dasar Biokimia</i>. Thenawijaya M., penerjemah. Jakarta : Penerbit Erlangga.</li> <li>2. Linder MC. 1992. <i>Biokimia Nutrisi dan Metabolisme</i>. Parakkasi A, penerjemah..Jakarta : Penerbit UI Press.</li> <li>3. Murray RK, Granner DK, Mayes PA, Rodwell VW. 1999. <i>Biokimia Harper</i>. Hartono A, penerjemah; Santoso AH, editor. Jakarta: Penerbit Buku Kedokteran EGC</li> </ol>								
	<b>Additional Reference</b>								
	<ol style="list-style-type: none"> <li>1. Piliang WG. 2006. <i>Fisiologi Nutrisi</i>. Bogor : IPB Press.</li> <li>2. Piliang WG. 2006. <i>Nutrisi Vitamin</i>. Bogor : IPB Press.</li> <li>3. Piliang WG, 2006. <i>Nutrisi Mineral</i> Bogor : IPB Press.</li> <li>4. Stipanuk MH. 2000. <i>Biochemical and Physiological aspects of Human Nutrition</i>. Philadelphia, PA 19106: W.B. Saunders Company. An Imprint of Elsevier Science. The Curtis Center Independence Square West,.</li> <li>5. Stryer L. 2000. <i>Biokimia</i>. Tim penerjemah bagian biokimia FKUI, penerjemah Soebianto SZ, Setiadi E., Editor. Jakarta: Penerbit Buku Kedokteran EGC.</li> </ol>								
<b>Teaching Team</b>	Prof. Dr. Ir. Asmuddin Natsir, M.Sc., Dr. Ir. Syahriani, M.Si., Dr. A. Mujnisa, S.Pt.,MP., Prof.Dr. Ir. Sri Purwanti, S.Pt.,M.Si., IPU., ASEAN Eng., Prof. Dr. Ir. Muhammad Irfan Said, S.Pt., MP., IPM, ASEAN Eng., Marhamah Nadir, SP., M.Si., Ph.D., Abdul Alim Yamin, S.Pt, M.Si, Ismah Ulfiyah Azis, S.Pt., M.Sc.								
<b>Course requirements</b>									
<b>Week</b>	<b>Sub CLO</b> (End ability of each learning stage)		<b>Assesment</b>		<b>Forms and Methods of Learning</b> [time estimate]		<b>Content</b>	<b>Weight of Assesment (%)</b>	

		Indicator	Technique & Criteria	Offline	Online		
1	2	3	4	5	6	7	8
1-2	Able to analyze SLP and material on cell organization and function ()	<p><b>Formative:</b> Attendance, active discussion, submitting final assignment</p> <p><b>Summative:</b> Individual Paper Assignments and Quizzes</p>	<p><b>Formative criteria:</b> Attendance, active discussion, submitting independent assignments</p> <p><b>Summative criteria:</b> Quiz (2.5) graded with rubric I011240004</p> <p>Individual Paper Assignment (5)</p> <p><b>Assessment Technique:</b> Test</p>	<p><b>Studying:</b> Cooperative learning Interactive lecture</p> <p>2 x 2 x 50 minutes</p>		<ul style="list-style-type: none"> <li>• Contract and learning plan, SLP and scope of animal husbandry biochemistry course</li> <li>• Organization and function of cell organelles.</li> </ul>	7,5
3	Able to analyze the concept of enzymes, enzyme kinetics and digestive enzymes ()	<p><b>Formative:</b> Attendance, active discussion, submitting final assignment</p> <p><b>Summative:</b> Able to analyze the concept of enzymes, enzyme kinetics and digestive enzymes Able to analyze the concept of enzymes, enzyme kinetics and digestive enzymes</p>	<p><b>Formative Criteria:</b> Attendance, active discussion, submitting independent assignments.</p> <p><b>Summative Criteria:</b> Case Study (5) assessed with rubric I011240002</p> <p>Quiz (2.5)</p> <p><b>Assessment Techniques:</b> Test and Non- Test</p>	<p><b>Studying:</b> Cooperative learning</p> <p>1 x 2 x 50 minutes</p>		Enzymes, enzyme kinetics and digestive enzymes	7,5

4-5	Able to analyze the process of photosynthesis and chemosynthesis in plants ()	<p><b>Formative:</b></p> <p>Attendance, active discussion, submitting final assignment</p> <p><b>Summative:</b></p> <p>Ability to analyze the process of photosynthesis and chemosynthesis in plants</p>	<p><b>Formative Criteria:</b></p> <p>Attendance, active discussion, submitting independent assignments.</p> <p><b>Summative Criteria:</b></p> <p>Problem Base Learning (5)</p> <p>Case Study (5)</p> <p>Quiz (5)</p>	<p><b>Studying:</b></p> <p>Small Group Discussion, Cooperative learning</p> <p>2 x 50</p>		<p>Biochemistry of photosynthesis</p> <p>Biochemistry of chemosynthesis</p>	15
6-7	Able to analyze the structure, type and function of nucleic acids and protein metabolism ()	<p><b>Formative:</b></p> <p>Attendance, active discussion, submitting final assignment</p> <p><b>Summative:</b></p> <p>Completion of analyzing the structure, type and function of nucleic acids and protein metabolism</p>	<p><b>Formative Criteria:</b></p> <p>Attendance, active discussion, submitting independent assignments.</p> <p><b>Summative Criteria:</b></p> <p>Individual Paper Assignment (5)</p> <p>Case Study (5)</p> <p>Quiz (5)</p>	<p><b>Studying:</b></p> <p>Small Group Discussion, Cooperative learning, Project-based Learning</p> <p>2 x 2 x 50"</p>		<ul style="list-style-type: none"> <li>● <b>Structure and function of nucleic acids</b></li> <li>● <b>Protein metabolism</b></li> </ul>	15

8-9	Able to analyze the process of carbohydrate metabolism ()	<p><b>Formative:</b></p> <p>Attendance, active discussion, submitting final assignment</p> <p><b>Summative:</b></p> <p>Proficiency in analyzing carbohydrate metabolic process</p>	<p><b>Formative Criteria:</b></p> <p>Attendance, active discussion, submitting independent assignments.</p> <p><b>Summative Criteria:</b></p> <p>Individual Paper Assignment (5) Case Study (5)</p>	<p><b>Studying:</b></p> <p><b>Studying:</b></p> <p>Small Group Discussion, Cooperative learning, Problem-based Learning</p> <p>2 x 2 x 50"</p>		<ul style="list-style-type: none"> <li>•• Structure and function of carbohydrates in the process of glycolysis, glycogenesis and gluconeogenesis</li> <li>• Citric acid cycle, electron transport system</li> </ul>	15
10-11	Able to analyze the process of fat metabolism ()	<p><b>Formative:</b></p> <p>Attendance, active discussion, submitting final assignment</p> <p><b>Summative:</b></p> <p>Accuracy in analyzing the process of fat metabolism</p>	<p><b>Formative criteria:</b></p> <p>Attendance, active discussion, submitting independent assignments.</p> <p><b>Summative Criteria:</b></p> <p>Individual Paper Assignment (5) Case Study (5)</p> <p><b>Assessment Techniques</b></p> <p>Test and Non- Test</p>	<p><b>Studying:</b></p> <p>Small group discussion, case study, cooperative learning.</p> <p>2 x 2 x 50"</p>		Structure and function of fat in the metabolic process of lipolysis and lipogenesis	15

12	Able to analyze the benefits of water in the metabolic process ()	<p><b>Formative:</b> Attendance, active discussion, submitting final assignment</p> <p><b>Sumative:</b> Accuracy in analyzing the benefits of water in the metabolic process</p>	<p><b>Formative Criteria:</b> Attendance, active discussion, submitting independent assignments.</p> <p><b>Sumative:</b> Individual Paper Assignment (2.5) Quiz (2.5)</p> <p><b>Assessment Technique:</b> Test</p>	<p><b>Studying:</b> Small group discussion, case study</p> <p>2 x 50 minutes</p>		Water and the function of water in metabolic processes	5
13-14	Able to analyze the benefits of vitamins in the metabolic process ()	<p><b>Formative:</b> Attendance, active discussion, submitting final assignment</p> <p><b>Sumative:</b> Accuracy in analyzing the benefits of vitamins in the metabolic process</p>	<p><b>Formative criteria:</b> Attendance, active discussion, submitting independent assignments.</p> <p><b>Summative Criteria:</b> Individual Paper Assignment (5) Quiz (5)</p> <p><b>Assessment Technique:</b> Test</p>	<p><b>Studying:</b> Small group discussion</p> <p>2 x 2 x 50"</p>		Structure and function of water soluble vitamins and fat soluble vitamins in metabolic processes	10
15-16	Able to analyze the benefits of minerals in the metabolic process ()	<p><b>Formative:</b> Attendance, active discussion, submission of final assignment</p>	<p><b>Formative Criteria:</b> Attendance, active discussion, submitting independent</p>	<p><b>Studying:</b> Small group discussion, collaborative</p>		<b>Structure and function of macro and micro minerals in metabolic processes</b>	10

		<b>Sumative:</b> Accuracy in analyzing the benefits of minerals in the metabolic process	assignments. <b>Summative Criteria:</b> Individual Paper Assignment (5) Quiz (5) <b>Assessment Technique:</b> Non Test	learning  2 x 2 x 50			
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**Matrix ILO, CLO, and Assessment Method**

ILO/CLO
ILO-3 (P2)
ILO-4 (KU1)

**Evaluation Type and Assessment Weight**

<b>Type</b>	<b>Assessment Weight</b>
Case Study	25
Quiz	37.5
Problem Base Learning	5
Individual Paper Assignment	32.5
Total	100
Total	100

**Assessment and Evaluation of Student Achievement of CLO**

SLOs imposed on MK	CLO	SUB CLO	Form of Assessment*				Weight	Value	Student Score	
			Formative	Summative						
				Case Study	Quiz	Problem Base Learning				Individual Paper Assignment
SLO-	SLOS-	SUB-CLO-1	Attendance, active discussion, submitting independent assignments.	0	2.5	0	5	7.5		
SLO-	CLO-	SUB-CLO-2	Attendance, active discussion, submitting independent assignments.	5	2.5	0	0	7.5		
SLO-	CLO-	SUB-CLO-3	Attendance, active discussion, submitting independent assignments.	5	5	5	0	15		
SLO-	CLO-	SUB-CLO-4	Attendance, active discussion, submitting independent assignments.	5	5	0	5	15		
SLO-	CLO-	SUB-CLO-5	Attendance, active discussion, submitting independent assignments.	5	5	0	5	15		
SLO-	CLO-	SUB-CLO-6	Attendance, active discussion, submitting independent assignments.	5	5	0	5	15		
SLO-	CLO-	SUB-CLO-7	Attendance, active discussion, submitting independent assignments.	0	2.5	0	2.5	5		
SLO-	CLO-	SUB-CLO-8	Attendance, active discussion, submitting independent assignments.	0	5	0	5	10		
SLO-	CLO-	SUB-CLO-9	Attendance, active discussion, submitting independent assignments.	0	5	0	5	10		
				25	37.5	5	32.5	100		



**HASANUDDIN UNIVERSITY  
FACULTY OF ANIMAL SCIENCE  
BACHELOR PROGRAMME IN ANIMAL HUSBANDRY**

**STUDENT STRUCTURED ASSIGNMENT PLAN**

<b>Course</b>	Biochemistry				
<b>Code</b>	23101110503	<b>Credits Points</b>	3	<b>Semester</b>	1 (one)
<b>Developer Lecturer</b>	Dr. Ir. Syahriani, M.Si.				
<b>Task Form</b>	<b>Task Time</b>				
Documents/Magazines	2 Weeks				
<b>Task Title</b>					
Cell organization and function, enzymes and enzyme kinetics, biochemistry of photosynthesis and chemosynthesis.					
<b>Course Learning Outcomes</b>					
SUB-CLO-3: Able to analyze cell organization, enzymes and enzyme kinetics, and photosynthesis biochemistry according to planned specifications (ILO 1)					
<b>Task Description</b>					
<p>The students' assignment is a group project to write a paper on "Basic Principles of Cell Organization, Enzymes and Enzyme Kinetics, Biochemistry of Photosynthesis and Chemosynthesis." The paper should be written according to the following procedure:</p> <ol style="list-style-type: none"> <li>1) Each group chooses 1 of the sub-topics for 1 group.</li> <li>2) Discuss among the group members to identify the process stages for each of the selected sub-topics. Information related to the selected sub-topic can be obtained from textbooks and journals.</li> <li>3) Create a paper with the following systematics:             <ol style="list-style-type: none"> <li>I. Introduction</li> <li>II. Discussion</li> <li>III. Conclusion</li> <li>IV. Literature</li> </ol> </li> <li>4) Group presentation</li> </ol>					
<b>Assignment Method</b>					
1. Conducted in groups using the Small Group Discussion (SGD) learning method.					
<b>Form and Format of Output</b>					
a. Object of Cultivation: Cell organization, enzymes and enzyme kinetics, and the biochemistry of photosynthesis b. Form of Output: Paper					
<b>Indicators, Criteria and Assessment Weight</b>					
<b>Indicators:</b> <ol style="list-style-type: none"> <li>1. Systematics: 10%</li> <li>2. Accuracy of analysis: 25%</li> <li>3. Depth of material: 30%</li> <li>4. Novelty and reputation of library materials: 10%</li> <li>5. Team cohesiveness: 10%</li> <li>6. Mastery of the material: 15%</li> </ol>					
<b>Implementation Schedule</b>					
2 weeks					

<b>Other</b>
-
<b>Reference List</b>
<ol style="list-style-type: none"> <li>1. Lehninger. 1999. Dasar-Dasar Biokimia. Thenawijaya M., penerjemah. .Jakarta : Penerbit Erlangga.</li> <li>2. Linder MC. 1992. Biokimia Nutrisi dan Metabolisme. Parakkasi A, penerjemah..Jakarta : Penerbit UI Press.</li> <li>3. Murray RK, Granner DK, Mayes PA, Rodwell VW. 1999. Biokimia Harper. Hartono A, penterjemah; Santoso AH, editor. Jakarta: Penerbit Buku Kedokteran EGC.</li> <li>4. Piliang WG. 2006. Fisiologi Nutrisi. Bogor : IPB Press.</li> <li>5. Piliang WG. 2006. Nutrisi Vitamin. Bogor : IPB Press.</li> <li>6. Piliang WG, 2006. Nutrisi Mineral Bogor : IPB Press.</li> </ol>

DEFINITION OF 1 CREDIT IN THE FORM OF LEARNING				Time
A	Lecture, Reception, Tutorial			
	Face to Face	Structured Assignment	Independent Learning	
	50 minutes/week/semester	60 minutes/week/semester	60 minutes/week/semester	2,83
B	Seminars or other similar forms of learning			
	Face to face	Self-study		
	100 minutes/week/semester	70 minutes/week/semester		2,83
C	Practicum, studio practice, workshop practice, field practice, research, community service, and/or other equivalent forms of learning			
	170 minutes/week/semester			2,83

No	Metode Pembelajaran Mahasiswa	Kode
1	Small Group Discussion	SGD
2	Role-Play & Simulation	RPS
3	Discovery Learning	DL
4	Self-Directed Learning	SDL
5	Cooperative Learning	CoL
6	Collaborative Learning	CbL
7	Contextual Learning	CtL
8	Project Based Learning	PjBL
9	Problem Based Learning & Inquiry	PBL
10	Atau metode pembelajaran lain, yang dapat secara efektif memfasilitasi pemenuhan capaian pembelajaran lulusan.	