SEMESTER LESSON PLAN

LESSON PLAN DEVELOPER(S):

Dr. Ir. Mohamad Fadjar, M.Sc

Lecturer in Advance Aquaculture, Faculty of Fisheries and Marine Science, Universitas Brawijaya

AQUACULTURE MASTER'S PROGRAM
FACULTY OF FISHERIES AND MARINE SCIENCE
UNIVERSITAS BRAWIJAYA
2021

SEMESTER LESSON PLAN

1. Course Identity

Study Program	: Aquaculture Master's Program
Course	: Advance Aquaculture
Course Code	: PIB8101
Course Group	: Production and Reproduction
Credit	: 3
Degree	: Master's Degree
Semester	: 1
Pre-requisite	: (If any, write the course code)
Status	: Compulsory of Interest
Lecturers' Names and Codes	: Dr. Ir. Mohamad Fadjar, M.Sc
	Dr.Ir. Maheno Sri Widodo, MS
	Dr. Yunita Maimunah, S.Pi., MSc.
	Dr. Yunita Maimunah, S.Pi., MSc.
	Dr. Ating Yuniarti, S.Pi., M.Aqua.
	Dr.Ir. Arning Wilujeng Ekawati, MS.
	Prof.Dr.Ir. Arief Prajitno, MS.

2. Course Description

This course discusses the basic concepts of Advance Aquaculture. Advance Aquacultureis very closely related to innovations in aquaculture and technologies to support sustainable aquaculture. In Advance Aquaculture, students have to understand and be able to manage sustainable Advance Aquaculture through innovations in nutritional aspects and fish health.

3. Program Learning Outcomes (PLO)

1. Being able to develop the existing concepts and create new knowledge in the field of sustainable aquaculture and Best Management Practices of Aquaculture.

4. **Course Learning Outcomes**

After completing this course, students will be able to:

1. understand the basic concepts of Advance Aquaculture
2. understand innovation and technologies to support sustainable aquaculture.
3. understand and carry out the management of sustainable Advance Aquaculture based on new innovations both in terms of nutrition and fish health..

5. Lesson Plan

Week	PLO Indicator	Topic	Learning Method	Time Allotment	Learning Activities	Scoring	Learning Sources
1.	1.1 Comprehension in the basic concepts of aquaculture development	Introduction - The definition of development and aquaculture - Basic concept of Advance Aquaculture	• Lecture (S)	2	Note taking (A) Working on assignments (A)	Criteria: Scoring Guidelines Non-test: summarizing lecture materials (A)	1) Arning, W.E. et al. (2017)The Influence of Fermentation Time in the Physical and Chemical Composition of Fermented Soybean Husk by Using Aspergillus niger on the Quality of Raw Feed Materials. The Journal of Experimental Life Science. 6(1): 52-57 2) Fadjar. et al. (2016) A Simple And Effective Method For Calculation And 3d Visualization Of Biofilm Produced By Vibrio Cholerae. Media Penelitian Dan Pengembangan Kesehatan. 25(3): 147-152

Week	PLO Indicator	Topic	Learning Method	Time Allotment	Learning Activities	Scoring	Learning Sources
2.	2.1 Comprehension of innovations and technology advancement in supporting aquaculture	Aquaculture technology - Innovations in technology that support aquaculture	• Lecture (S) • Assignment (A) & Presentation (S)	2	Note taking (A) Working on assignments (A)	Criteria: Scoring Guidelines Non-test: - summarizing lecture materials (A) - group or independent presentation(S)	1) Arning, W.E. et al. (2017)The Influence of Fermentation Time in the Physical and Chemical Composition of Fermented Soybean Husk by Using Aspergillus niger on the Quality of Raw Feed Materials. The Journal of Experimental Life Science. 6(1): 52-57 2) Fadjar. et al. (2016) A Simple And Effective Method For Calculation And 3d Visualization Of Biofilm Produced By Vibrio Cholerae. Media Penelitian Dan Pengembangan Kesehatan. 25(3): 147-152
3.	3.1 Comprehension of issues regarding Advance Aquaculture and environmental-based approach	Advance Aquaculture based on environmental approach - Issues in aquacutlure development from environmental perspective	• Lecture (S) • Assignment (A) & Presentation (S)	2	Note taking (A) Working on assignments (A)	Criteria: Scoring Guidelines Non-test: - summarizing lecture materials (A) - group or independent presentation(S)	1) Arning, W.E. et al. (2017)The Influence of Fermentation Time in the Physical and Chemical Composition of Fermented Soybean Husk by Using Aspergillus niger on the Quality of Raw Feed Materials. The Journal of Experimental Life Science. 6(1): 52-57

Week	PLO Indicator	Topic	Learning Method	Time Allotment	Learning Activities	Scoring	Learning Sources
							2) Fadjar. et al. (2016) A Simple And Effective Method For Calculation And 3d Visualization Of Biofilm Produced By Vibrio Cholerae. Media Penelitian Dan Pengembangan Kesehatan. 25(3): 147-152
4.	4.1 Comprehension of pond construction design	Pond construction design - Location properness - Construction of concrete pond, tarpaulin pond (membrane), and fiber pond	• Quiz 1 (S) • Lecture (S) • Assignment (A) & Presentation (S)	2	Note taking (A) Working on assignments (A)	Criteria: Scoring Guidelines Non-test: - summarizing lecture materials (A) - group or independent presentation(S)	1) Arning, W.E. et al. (2017)The Influence of Fermentation Time in the Physical and Chemical Composition of Fermented Soybean Husk by Using Aspergillus niger on the Quality of Raw Feed Materials. The Journal of Experimental Life Science. 6(1): 52-57 2) Fadjar. et al. (2016) A Simple And Effective Method For Calculation And 3d Visualization Of Biofilm Produced By Vibrio Cholerae. Media Penelitian Dan Pengembangan Kesehatan. 25(3): 147-152
5.	5.1 Comprehension of Pipeline	Pipeline construction, aeration, and filtering	• Lecture (S)	2	Note taking	Criteria: Scoring	1) Arning, W.E. et al. (2017)The Influence

Week	PLO Indicator	Topic	Learning Method	Time Allotment	Learning Activities	Scoring	Learning Sources
	construction, aeration and filtration as part of Advance Aquaculture	system. - Understand the design of the Pipeline - Understand the design of aeration construction - Understand the filter construction design	• Assignment (A) & Presentation (S)		(A) Working on assignments (A)	Guidelines Non-test: - summarizing lecture materials (A) - group or independent presentation(S)	of Fermentation Time in the Physical and Chemical Composition of Fermented Soybean Husk by Using Aspergillus niger on the Quality of Raw Feed Materials. The Journal of Experimental Life Science. 6(1): 52-57 2) Fadjar. et al. (2016) A Simple And Effective Method For Calculation And 3d Visualization Of Biofilm Produced By Vibrio Cholerae. Media Penelitian Dan Pengembangan Kesehatan. 25(3): 147-152
6.	6.1 Water quality control and waste management method	Aquaculture water and waste quality management - Aquaculture water quality management - Aquaculture wastewater management	• Lecture (S) • Lecture (S) • Assignment (A) & Presentation (S)	2	Note taking (A) Working on assignments (A)	Criteria: Scoring Guidelines Non-test: - summarizing lecture materials (A) - group or independent presentation(S)	1) Arning, W.E. et al. (2017)The Influence of Fermentation Time in the Physical and Chemical Composition of Fermented Soybean Husk by Using Aspergillus niger on the Quality of Raw Feed Materials. The Journal of Experimental Life Science. 6(1): 52-57 2) Fadjar. et al. (2016) A Simple And Effective

Week	PLO Indicator	Topic	Learning Method	Time Allotment	Learning Activities	Scoring	Learning Sources
							Method For Calculation And 3d Visualization Of Biofilm Produced By Vibrio Cholerae. Media Penelitian Dan Pengembangan Kesehatan. 25(3): 147-152
7.	7.1 Comprehension of *probiotic as a management tool*	Probiotic as a management tool - Comprehension of probiotic bacteria cycle	• Lecture (S) • Assignment (A) & Presentation (S)	2	Note taking (A) Working on assignments (A)	Criteria: Scoring Guidelines Non-test: - summarizing lecture materials (A) - group or independent presentation(S)	1) Arning, W.E. et al. (2017)The Influence of Fermentation Time in the Physical and Chemical Composition of Fermented Soybean Husk by Using Aspergillus niger on the Quality of Raw Feed Materials. The Journal of Experimental Life Science. 6(1): 52-57 2) Fadjar. et al. (2016) A Simple And Effective Method For Calculation And 3d Visualization Of Biofilm Produced By Vibrio Cholerae. Media Penelitian Dan Pengembangan Kesehatan. 25(3): 147-152
8.	**MIDTERM EXAM**						
9.	9.1 Comprehension of Biofloc technology	Biofloc technology and Biofilter Management	• Lecture (S) • Assignment	2	Note taking (A)	Criteria: Scoring	1) Arning, W.E. et al. (2017)The Influence

Week	PLO Indicator	Topic	Learning Method	Time Allotment	Learning Activities	Scoring	Learning Sources
	and Biofilteration Management	- The concept of aquaculture using Biofloc technology - *Biofilter* management using BFT	(A) & Presentation (S)		Working on assignments (A)	Guidelines Non-test: - summarizing lecture materials (A) - group or independent presentation(S)	of Fermentation Time in the Physical and Chemical Composition of Fermented Soybean Husk by Using Aspergillus niger on the Quality of Raw Feed Materials. The Journal of Experimental Life Science. 6(1): 52-57 2) Fadjar. et al. (2016) A Simple And Effective Method For Calculation And 3d Visualization Of Biofilm Produced By Vibrio Cholerae. Media Penelitian Dan Pengembangan Kesehatan. 25(3): 147-152
10	10.1 Comprehension of the relationship between Biofilms and Bacterial Quorumsensing	Biofilm and bacterial Quorumsensing - Biofilm - Bacterial Quorumsensing as a process of biofilm making	• Lecture (S) • Assignment (A) & Presentation (S)	2	Note taking (A) Working on assignments (A)	Criteria: Scoring Guidelines Non-test: - summarizing lecture materials (A) - group or independent presentation(S)	1) Arning, W.E. et al. (2017)The Influence of Fermentation Time in the Physical and Chemical Composition of Fermented Soybean Husk by Using Aspergillus niger on the Quality of Raw Feed Materials. The Journal of Experimental Life Science. 6(1): 52-57 2) Fadjar. et al. (2016) A Simple And Effective

Week	PLO Indicator	Topic	Learning Method	Time Allotment	Learning Activities	Scoring	Learning Sources
							Method For Calculation And 3d Visualization Of Biofilm Produced By Vibrio Cholerae. Media Penelitian Dan Pengembangan Kesehatan. 25(3): 147-152
11	11.1 Comprehension of fish feed in Advance Aquaculture	Fish feed in Advance Aquaculture - Advance Aquaculture though innovation in fish feed - The use of enzymes and nutrition from non-raw materials	• Lecture (S) • Assignment (A) & Presentation (S)	2	Note taking (A) Working on assignments (A)	Criteria: Scoring Guidelines Non-test: - summarizing lecture materials (A) - group or independent presentation(S)	1) Arning, W.E. et al. (2017)The Influence of Fermentation Time in the Physical and Chemical Composition of Fermented Soybean Husk by Using Aspergillus niger on the Quality of Raw Feed Materials. The Journal of Experimental Life Science. 6(1): 52-57 2) Fadjar. et al. (2016) A Simple And Effective Method For Calculation And 3d Visualization Of Biofilm Produced By Vibrio Cholerae. Media Penelitian Dan Pengembangan Kesehatan. 25(3): 147-152
12	12.1 Comprehension of substitute protein sources as raw materials	- Presentation and group discussion	• Presentation (S)	2	Working on assignments (A)	Criteria: Scoring Guidelines	1) Arning, W.E. et al. (2017)The Influence of Fermentation Time in the Physical and

Week	PLO Indicator	Topic	Learning Method	Time Allotment	Learning Activities	Scoring	Learning Sources
						Non-test: - group or independent presentation(S)	Chemical Composition of Fermented Soybean Husk by Using Aspergillus niger on the Quality of Raw Feed Materials. The Journal of Experimental Life Science. 6(1): 52-57 2) Fadjar. et al. (2016) A Simple And Effective Method For Calculation And 3d Visualization Of Biofilm Produced By Vibrio Cholerae. Media Penelitian Dan Pengembangan Kesehatan. 25(3): 147-152
13	13.1 Comprehension of disease identification and prevention and development of vaccines in aquaculture	Disease identification and prevention and development of vaccines in aquaculture. - Disease identification and its prevention - Vaccine development in aquaculture	• Lecture (S) • Assignment (A) & Presentation (S)	2	Note taking (A) Working on assignments (A)	Criteria: Scoring Guidelines Non-test: - summarizing lecture materials (A) - group or independent presentation(S)	1) Arning, W.E. et al. (2017)The Influence of Fermentation Time in the Physical and Chemical Composition of Fermented Soybean Husk by Using Aspergillus niger on the Quality of Raw Feed Materials. The Journal of Experimental Life Science. 6(1): 52-57 2) Fadjar. et al. (2016) A Simple And Effective Method For Calculation And 3d

Week	PLO Indicator	Topic	Learning Method	Time Allotment	Learning Activities	Scoring	Learning Sources
							Visualization Of Biofilm Produced By Vibrio Cholerae. Media Penelitian Dan Pengembangan Kesehatan. 25(3): 147-152
14	14.1 comprehension of disease treatment using herbal materials	- Presentation and group discussion	• Presentation (S)	2	Working on assignments (A)	Criteria: Scoring Guidelines Non-test: - group or independent presentation(S)	1) Arning, W.E. et al. (2017)The Influence of Fermentation Time in the Physical and Chemical Composition of Fermented Soybean Husk by Using Aspergillus niger on the Quality of Raw Feed Materials. The Journal of Experimental Life Science. 6(1): 52-57 2) Fadjar. et al. (2016) A Simple And Effective Method For Calculation And 3d Visualization Of Biofilm Produced By Vibrio Cholerae. Media Penelitian Dan Pengembangan Kesehatan. 25(3): 147-152
15	15.1 Comprehension of biosecurity as a part of Advance Aquaculture	- Biosecurity components as parts of aquaculture development	• Lecture (S) • Assignment (A) & Presentation	2	Note taking (A) Working on assignments (A)	Criteria: Scoring Guidelines Non-test:	1) Arning, W.E. et al. (2017)The Influence of Fermentation Time in the Physical and Chemical Composition of Fermented

Week	PLO Indicator	Topic	Learning Method	Time Allotment	Learning Activities	Scoring	Learning Sources
			(S)			- summarizing lecture materials (A) - group or independent presentation(S)	Soybean Husk by Using Aspergillus niger on the Quality of Raw Feed Materials. The Journal of Experimental Life Science. 6(1): 52-57 2) Fadjar. et al. (2016) A Simple And Effective Method For Calculation And 3d Visualization Of Biofilm Produced By Vibrio Cholerae. Media Penelitian Dan Pengembangan Kesehatan. 25(3): 147-152
16	**FINAL EXAM**						

Notes: S = Synchronous, A = Asynchronous, all soft skill achievement will be scored based on the analysis referring to the Learning Management System

6. References

1) Arning, W.E. et al. (2017)The Influence of Fermentation Time in the Physical and Chemical Composition of Fermented Soybean Husk by Using Aspergillus niger on the Quality of Raw Feed Materials. The Journal of Experimental Life Science. 6(1): 52-57
2) Fadjar. et al. (2016) A Simple And Effective Method For Calculation And 3d Visualization Of Biofilm Produced By Vibrio Cholerae. Media Penelitian Dan Pengembangan Kesehatan. 25(3): 147-152

7. Appendices

Appendix 1. *Learning Materials*

PPT 1 : Introduction
PPT 2 : Aquaculture technology
PPT 3 : Advance Aquaculturefrom an environmental point of view
PPT 4 : Pond construction design
PPT 5 : Pipeline construction, aeration and filtering
PPT 6 : Qater quality and aquaculture waste nanagement
PPT 7 : Probiotics as a management tool
PPT 8 : Biofloc technology and biofilteration management
PPT 9 : Biofilm and Quorumsensing bacteria
PPT 10 : Fish feed in aquaculture development
PPT 11 : Presentation and group discussion
PPT 12 : Identification of diseases and its prevention, and development of vaccines in aquaculture.
PPT 13 : Presentation and Discussion
PPT 14 : Biosecurity
Online learning resources: (URL/link)
and other learning resources: (URL/link)

Appendix 2 2. *Media*
Zoom Meeting: (*URL/link*)
Google Meet: (*URL/link*)

Appendix 3. *Assessment Instrument*

Scoring Rubric

Oral Presentation

Close to the Expectation (score 1-2)	Meeting the Expectation (score 3-4)	Exceeding the Expectation (score 5)
1) Presentation is not organized and not well developed 2) Material is not well-explained well 3) Theories and concepts are not thoroughly discussed 4) Presentation is not clear and not fluent 5) Lack of confidence in delivery, mostly note reading 6) Voice is unclear 7) Presentation does not attract audiences' attention 8) Inadequate responses to questions, inadequate comprehension of the material 9) Unsynchronized presentations 10) Exceeding the time limit, failing to complete the presentation	1) Presentation is rather well -organized and developed 2) Fair comprehension of the material being delivered 3) Theories and concepts are fairly discussed thoroughly 4) Presentation is fairly clear and fluent 5) Showing fairly strong confidence and speakers read notes wisely 6) Voice is quite clear 7) Able to engage audience's attention 8) Fairly good in responding to questions, showing excellent comprehension of the material being presented 9) Good synchronization of presentation flow 10) Exceeding the time limit yet presenters managed to complete the presentation	1) Presentation is very well organized and creatively developed 2) Very strong knowledge regarding the material being presented 3) Theories and concepts are very thoroughly-discussed 4) Presentation is very clear and smooth 5) Excellent confidence in delivery, reading notes very wisely 6) Voice is very clear 7) Adequately attracts audiences' attention well 8) Responding to questions very well, very strong comprehension of the material being delivered 9) Very clear synchronization in presentation flow 10) Not exceeding the time limit, presentation is completed

Written Assignments

Essay

Under the average (score 1 – 4)	Within the Average (score 5 – 8)	Above the Average (score 9 – 12)	Perfect (score 13 – 15)
1) Not using the right analytical method 2) Incorrect data analysis 3) Making wrong conclusions 4) No critical analysis of the data available	1) Using acceptable analytical methods 2) Data are well analyzed 3) Making relevant conclusions 4) There is a fairly critical analysis of the data 5) There are only one or two references yet irrelevant	1) Using a relatively precise analysis method 2) Proper data analysis 3) Making the right conclusion 4) Critical analysis of the data is found 5) There are many references	1) Using the correct analytical method 2) Effective data analysis 3) Making strongly effective conclusions 4) There is a strong critical analysis of the data 5) There are many references

5) No references 6) Unmatched literature review (theory, research) and questions 7) Using non-standardized language and poor cohesion 8) No explanation about the implications of the topics being discussed 9) Essay is not systematically-structured	6) Matching literature review (theory, research) and question 7) Using standard language with good cohesion between sentences 8) The implications of the topics being discussed are explained yet less thoroughly 9) Essay is not systematically-structured	yet irrelevant at this point 6) Matching literature review (theory, research) and questions 7) Using standard language and sentences are cohesive 8) There is a unique and critical explanation of the implications of the topics being discussed 9) Essay is systematically-arranged	with strong relevancy 6) Strongly matching literature review (theory, research) and questions 7) Using standard language with strong cohesion between sentences 8) There is a unique and very critical explanation of the implications of the topics being discussed 9) Essay is systematically and neatly arranged

Report

Under the average (score 1 – 4)	**Within the Average (score 5 – 8)**	**Above the Average (score 9 – 12)**	**Perfect (score 13 – 15)**
1) Not using the right analytical method 2) Incorrect data analysis 3) Making wrong conclusions 4) No critical analysis of the data available 5) No references 6) Unmatched literature review (theory, research) and questions 7) Using non-standardized language and poor cohesion 8) No explanation about the implications of the topics being discussed 9) Report is not systematically-structured	1) Using acceptable analytical methods 2) Data are well analyzed 3) Making relevant conclusions 4) There is a fairly critical analysis of the data 5) There are only one or two references yet irrelevant 6) Matching literature review (theory, research) and question 7) Using standard language with good cohesion between sentences 8) The implications of the topics being discussed are explained yet less thoroughly 9) Report is relatively not	1) Using a relatively precise analysis method 2) Proper data analysis 3) Making the right conclusion 4) Critical analysis of the data is found 5) There are many references yet irrelevant at this point 6) Matching literature review (theory, research) and questions 7) Using standard language and sentences are cohesive 8) There is a unique and critical explanation of the implications of the topics being discussed 9) Report is systematically-	1) Using the correct analytical method 2) Effective data analysis 3) Making strongly effective conclusions 4) There is a strong critical analysis of the data 5) There are many references with strong relevancy 6) Strongly matching literature review (theory, research) and questions 7) Using standard language with strong cohesion between sentences 8) There is a unique and very critical explanation of the implications of the topics being discussed 9) Report is systematically and

	systematically-structured	arranged	neatly arranged