SEMESTER LESSON PLAN

LESSON PLAN DEVELOPER(S):

Dr. Ir. Agoes Soeprijanto, MS

Lecturer in Aquatic Animal Breeding and Reproduction, 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	: Aquatic Animal Breeding and Reproduction
Course Code	: PIB 8105
Course Group	: Fish Reproduction
Credit	: 3
Degree	: Master's Degree
Semester	: Odd
Pre-requisite	: (If any, write the course code)
Status	: Compulsory
Lecturers' Names and Codes	: Dr. Ir. Agoes Soeprijanto, MS
	Dr. Ir. Maheno Sri Widodo, MS
	Dr.Ir. Abd. Rahem Faqih, M.Si.

2. Course Description

This course discusses various techniques used to breed aquatic animals such as triploidization, poluploidization, transgenesis and this course also explains factors affecting the reproduction of aquatic animals and basic reproduction knowledge in relation to fish breeding

3. Program Learning Outcomes (PLO)

Being able to develop the existing concept and create new knowledge in the field of aquatic breeding and reproduction (CPL 6).

4. **Course Learning Outcomes**

After completing this course, students will be able to:

1. understand the factors that affect the reproduction of aquatic animals
2. understand aquatic animal breeding techniques
3. understand the basics of aquatic animal reproduction

5. Lesson Plan

Week	PLO Indicator	Topic	Learning Method	Time Allotment	Learning Activities	Scoring	Learning Sources
1	1.1 Accuracy in explaining the definition of selected topics	- Definitions of selected topics.	• Lecture (S)	2	Note taking (A) Working on assignments (A)	Criteria: Scoring Guidelines Non-test: - summarizing lecture materials (A) - Group or independent presentation (S))	- Gurina, 2018 - Hayati, 2019 - Stabinska *et al*., 2016 - Moore et al., 2017 - Yanuar, 2017 - Buwono, 2020
2	2.1 Accuracy in explaining the basic knowledge of reproduction for fish breeding	- Basic knowledge of reproduction for fish breeding.	• 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)	- Gurina, 2018 - Hayati, 2019 - Stabinska *et al*., 2016 - Moore et al., 2017 - Yanuar, 2017 - Buwono, 2020
3	2.2 Accuracy in explaining and describing the knowledge of fish reproductive anatomy	- Knowledge of fish reproductive anatomy.	• Lecture (S) • Assignment (A) & Presentation (S)	2	Note taking (A) Working on assignments (A)	Criteria: Scoring Guidelines Non-test: - summarizing	- Gurina, 2018 - Hayati, 2019 - Stabinska *et al*., 2016 - Moore et al.,

Week	PLO Indicator	Topic	Learning Method	Time Allotment	Learning Activities	Scoring	Learning Sources
						lecture materials (A) - Group or independent presentation (S)	2017 - Yanuar, 2017 - Buwono, 2020
4	3. Accuracy in explaining and describing the knowledge of fish reproductive anatomy	- Triploidization Testing	• 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)	- Gurina, 2018 - Hayati, 2019 - Stabinska *et al*., 2016 - Moore et al., 2017 - Yanuar, 2017 - Buwono, 2020
5	3.2 Accuracy in explaining chromosome manipulation	- Chromosome manipulation	• 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)	- Gurina, 2018 - Hayati, 2019 - Stabinska *et al*., 2016 - Moore et al., 2017 - Yanuar, 2017 - Buwono, 2020
6	4.1 Accuracy in explaining polyploidization testing.	- polyploidization testing.	• 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	- Gurina, 2018 - Hayati, 2019 - Stabinska *et al*., 2016 - Moore et al., 2017 - Yanuar, 2017 - Buwono,

Week	PLO Indicator	Topic	Learning Method	Time Allotment	Learning Activities	Scoring	Learning Sources
						independent presentation (S)	2020
7	4. 2 Accuracy in explaining sexual and asexual reproduction.	- Sexual and asexual reproduction	• 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)	- Gurina, 2018 - Hayati, 2019 - Stabinska *et al*., 2016 - Moore et al., 2017 - Yanuar, 2017 - Buwono, 2020
8	**MIDTERM EXAM**						
9	5. 1 Accuracy in explaining classic breeding technique; cross breeding hybridization selection.	- Pemahaman tentang teknik pemuliaan klasik seleksi hibridisasi cross breeding. - Cross breeding hybridization selection.	• 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)	- Gurina, 2018 - Hayati, 2019 - Stabinska *et al*., 2016 - Moore et al., 2017 - Yanuar, 2017 - Buwono, 2020
10	5.2 Accuracy in explaining Gynogenesis and androgenesis techniques.	- Gynogenesis and androgenesis techniques.	• 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)	- Gurina, 2018 - Hayati, 2019 - Stabinska *et al*., 2016 - Moore et al., 2017 - Yanuar, 2017 - Buwono, 2020

Week	PLO Indicator	Topic	Learning Method	Time Allotment	Learning Activities	Scoring	Learning Sources
11	6.1 Accuracy in analyzing genetic diversity.	- Knowledge, definition and analysis of genetic diversity.	• 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)	- Gurina, 2018 - Hayati, 2019 - Stabinska *et al*., 2016 - Moore et al., 2017 - Yanuar, 2017 - Buwono, 2020
12	6.2 Accuracy in explaining the materials presented in previous week	- Presentation and Discussion	• Lecture (S) • Assignment (A) & Presentation (S)	2	Presentation and Discussion	Criteria: Scoring Guidelines Non-test: - summarizing lecture materials (A) - Group or independent presentation (S)	
13	6.3 Accuracy in explaining Transgenesis.	- Transgenesis.	• 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)	- Gurina, 2018 - Hayati, 2019 - Stabinska *et al*., 2016 - Moore et al., 2017 - Yanuar, 2017 - Buwono, 2020
14	6.5 Accuracy in explaining about Transgenesis II..	- Transgenes II.	• Lecture (S) • Assignment	2	Note taking (A) Working on	Criteria: Scoring Guidelines	- Gurina, 2018 - Hayati, 2019 - Stabinska *et*

Week	PLO Indicator	Topic	Learning Method	Time Allotment	Learning Activities	Scoring	Learning Sources
			(A) & Presentation (S)		assignments (A)	Non-test: - summarizing lecture materials (A) - Group or independent presentation (S)	*al*., 2016 - Moore et al., 2017 - Yanuar, 2017 - Buwono, 2020
15	7.1 Accuracy in explaining the materials presented in previous week	- Student presentation	• Lecture (S) • Assignment (A) & Presentation (S)	2	Presentation and Discussion	Criteria: Scoring Guidelines Non-test: - summarizing lecture materials (A) - Group or independent presentation (S)	Materi pada Minggu Sebelumnya
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) Gurina. 2018. Genetika dan Reproduksi Ikan. Yogyakarta: Deepublish. 254 hlm.
2) Hayati, A. 2019. Biologi Reproduksi Ikan. Surabaya: Airlangga University Press. 110 hlm.
3) Stabinska, A., J. Krol, R. Stabinski and P. Hliwa. 2016. Triploidization of percid fishes- a change for improvement and diversification of European aquaculture?. Polish Journal of Natural Science. 31 (4): 707-718.
4) Moore, L. J., T. O. Nilsen, J. Jarungsriapisit, P. G. Fjelldal, S. O. Stefansson, G. L. Taranger and S. Patel. 2017. Triploid atlantic salmon (Salmo salar L.) post-smolts accumulate prevalence more slowly than diploid salmon following bath challenge with salmonid alphavirus subtype 3. PLOS ONE. 12 (5).
5) Yanuar, I. 2017. Biologi Reproduksi Ikan. Surabaya: Hang Tuah University Press. 138 hlm.
6) Buwono, I. D. 2020. Aplikasi Program Pemuliaan Ikan Untuk Perbaikan Genetika Ikan Budi Daya. Yogyakarta: CV. Budi Utama. 101 hlm.
7) Kirpichnikov, V.S. 1981. Genetic Bases of Fish Selection. Springer-Verlag. Berlin. 410 page
8) Pirchner, F. 1981. Population Genetics in Animal Breeding. S. Chand & Company. New Delhi. 274 page
9) Tave, Douglas. 1986. Genetics for Fish Hatchery Managers. AVI Pub. Co. Connecticut. 299 page

10) Glick, BR. Pasternack, JJ. 2003. Molecular Biotechnology; Priciples and Application of Recombinant DNA.
11) ASM Press. Washington DC. 760 page
12) Hackett, PB. 1988. An Introduction to Recombinant DNA Techniques. The Benjamin/Cummings Publishing Company.
13) California. 243 page
14) Markert, CL. Ursprung H. 1974. Developmental Genetics. New Delhi. 214 page

7. Appendices

Appendix 1. *Learning Materials*

PPT 1 : Introduction – Selected Topics
PPT 2 : Basic Reproduction for Fish Breeding
PPT 3 : Reproductive Anatomy
PPT 4 : Triploidization
PPT 5 : Chromosome I . Manipulation
PPT 6 : Polyploidization
PPT 7 : Sexual and Asexual Reproduction
PPT 8 : Chromosome II Manipulation (Gyno, Andro, Super Y)
PPT 9 : Androgenesis
PPT 10 : Genetic Diversity (Selected Topics)
PPT 11 : Genetic Variation Analysis
PPT 12 : Transgenesis
PPT 13 : Transgenesis II
PPT 14 : Student Presentation
GenBank website (https://www.ncbi.nlm.nih.gov/genbank/)
Blast website (https://blast.ncbi.nlm.nih.gov/Blast.cgi)
MEGA7: Molecular Evolutionary Genetics Analysis Version 7.0
Online learning resources: (URL/link)
and other learning resources: (URL/link)

Appendix 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	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	1) Using a relatively precise analysis method 2) Proper data analysis 3) Making the right conclusion 4) Critical analysis of the data is found	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

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) Essay is not systematically-structured	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) Essay is not systematically-structured	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) Essay is systematically-arranged	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) 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	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

	systematically-structured	9) Report is systematically-arranged	9) Report is systematically and neatly arranged