COURSE LEARNING PLAN

UNIVERSITY OF BRAWIJAYA

FACULTY OF ANIMAL SCIENCE

DEPARTMENT OF ANIMAL SCIENCE

UNDERGRADUATE STUDY PROGRAM OF ANIMAL SCIENCE

LEARNING PLAN: Animal Reproduction Science

Course	Code	Weight (credits)	Semester	Compilation Date
Animal Reproduction Science	PEP 61007	3 credits	3	25/08/2020

Authorization	Course Coordinator	Ka PS S1	Vice Dean 1
	Prof. Dr. Ir. Trinil Susilawati, MS, IPU, ASEAN Eng	Dr. Herly Evanuarini, S.Pt, MP	Dr. Ir. Halim Natsir, MP, IPM, ASEAN Eng

Learning Outcomes (LO)

PLO

1. Able to apply biological science, physiology, nutrition science, breeding science, animal raising management to comprehend the concept and implement it in the field of animal science (LO 6)
2. Able to demonstrate independent, quality, and measurable performance (both quality and quantity) effectively, efficiently, and sustainably (LO 7)
3. Able to involve themselves in the learning process and discussion on an ongoing basis (LO10)

CLO

1. The students understand how to manage animals in order to achieve reproductive efficiency (LO 7)
2. The students are able to understand puberty and the factors that influence it, cement production, spermatozoa travel, fertilization and embryonic development (LO 6)
3. The students are able to understand reproductive hormones and endocrinology of the estrous cycle, pregnancy, and delivery and lactation (LO 6 and LO10)
4. The students are able to understand reproductive physiology in poultry and embryonic development in poultry (LO 6)
5. The students are able to understand reproductive disorders (LO 7)

Brief Course Description

This course discusses puberty in male animals, changes in the physiology of spermatozoa inside the male and female reproductive tracts, natural fertilization, embryonic development, pregnancy, delivery, the role of hormones in pregnancy and delivery, also explaining the stages of estrous, pregnant animal, delivery, endocrinology during the estrous cycle, pregnancy, and partus.

Topics

1. Introduction
   - The Relationship between Reproductive Science and other Sciences

- The role of Animal Science in a livestock business

2. Puberty and cement production
   - Definition and signs of puberty in male and female animal
   - The process of puberty (Target Weight Theory)
   - Factors affecting puberty
   - Libido and the factors that influence it
   - Factors affecting cement production (genetic, management, and environmental)
3. Reproductive Endocrinology
   - Differences in hormones, neurohormonal, and neurotransmitters
   - Classification of hormone based on the material and function
   - Glands that produce reproductive hormones and their functions
   - Hormones produced by the gonads
   - The mechanism of hormone action
   - The mechanism of hormone action and their target organs
   - Neuroendocrine
   - Neurotransmitters
4. Estrous Cycle
   - Folliculogenesis and luteolysis
   - Phases in the estrous cycle
   - Signs of estrous
   - Repeat breeder and long cycle
5. Endocrinology during the estrous cycle
   - Ovary and hormonal conditions during proestrus
   - Ovary and hormonal conditions during estrous
   - Ovary and hormonal conditions in estrous
   - Ovary and hormonal conditions in estrous
6. Endocrinology of pregnancy and delivery
   - Hormonal conditions during pregnancy
   - Hormonal changes during pregnancy
   - Hormonal changes before and during delivery (including Progesterone, Estrogen, PGF2α, Oxytocin)
   - Delivery process
7. Spermatozoa transport and fertilization
   - Spermatozoa transport in male reproductive organs (seminiferous tubules, epididymis, and ejaculate)
   - Spermatozoa transport in female reproductive organs (cervix, uterus, oviduct)
   - Changes in spermatozoa function (before capacitation, capacitation, and acrosome reactions)
   - Ovulation process
   - Maturation and ovum transport
   - Fertilization process (fertilization stage)
8. Cleavage, determination, and differentiation
   - Sex Determination
   - The process of cell division in zygote
   - Embryonic cell differentiation and early embryonic development
   - Implantation process
   - Factors affecting embryo travel to implantation
   - The process of forming body organs
9. Lactation and puerperium

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Lactation Process
The role of lactation for reproduction
The process of returning the reproductive organs post-partum
The role of the prolactin hormone on the formation of milk, oxytocin on milk letdown, and the effects of prolactin on anestrus

10. Reproductive physiology in poultry

Hen’s reproductive organs
Rooster’s reproductive organs
The process of producing spermatozoa and ovum

11. Embryonic development in poultry

Fertilization process in poultry
Embryonic formation and development in poultry
Factors affecting embryonic development

12. Reproductive disorders and failure

Disorders of the estrous cycle (silent heat, short cycle, long cycle, and repeat breeding)
Sub fertile and the affecting factors
Sterile and the affecting factors
Reproductive diseases that cause reproductive disorders and sterile

13. Reproductive efficiency

Factors affecting reproductive efficiency
Ways to increase reproductive efficiency
The effect of reproductive efficiency in the success of the livestock business

14. Material Review

Reproductive Hormones
Endocrinology of the estrous cycle, pregnancy, and delivery
Reproductive disorders
Reproductive efficiency

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<tr><td>References</td><td>1. Farm Animal Reproduction (Hafez and Hafez, 2008)
2. Fisiologi Reproduksi (Yekti et al., 2018)
3. Ilmu reproduksi (Ihsan, ...)</td></tr>
<tr><td rowspan="2">Learning Media</td><td>Software</td><td>Hardware</td></tr>
<tr><td>Software, PowerPoint, Video</td><td>Laptop, LCD, White Board</td></tr>
<tr><td>Teaching Team</td><td colspan="2">1. Prof. Dr. Ir .Trinil Susilawati, MS, IPU, ASEAN Eng
2. Prof. Dr. Agr. Ir. Suyadi, MS, IPU, ASEAN Eng
3. Prof. Dr. Ir. Muhammad Nur Ihsan, MS
4. Prof. Dr. Ir. Woro busono,MS
5. Dr. Ir. Nurul Isnaini, MP
6. Dr. Ir. Sri Wahyuningsih, Msi</td></tr>
</table>

	7.Aulia Puspita Anugra Yekti, Spt, MP,Msc 8. Dr. Achadiah Rahmawati, S.Pt, M.Si
Prerequisite Courses	Animal Biology Animal Anatomy and Physiology

Week	Sub-CLO	Indicator	Learning Materials / Topics	Learning Methods	Criteria & Form of Assessment	Weighted Score (%)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1	The students understand the scope of the course and its relationship with other courses	Able to understand	Introduction ● The relationship between Reproductive Science and other Sciences ● The role of Animal Science in a livestock business	Tutorial, Presentation, and Discussion	Activeness and Questions and Answers	
2	The students are able to identify puberty animal in male and female animals The students understand the factors affecting libido and cement production	Able to identify	Puberty and cement production ● Definition and signs of puberty in male and female animal ● The process of puberty (Target Weight Theory) ● Factors affecting puberty ● Libido and the factors that influence it ● Factors affecting cement production (genetic, management, and environmental)	Tutorial, Presentation, and Discussion	Activeness and Questions and Answers	
3	The students understand and identify	Able to identify and understand	Reproductive Endocrinology	Tutorial, Presentation,		

	systems affecting reproduction and their mechanisms	the mechanism	• Differences in hormones, neurohormonal, and neurotransmitters • Classification of hormone based on the material and function • Glands that produce reproductive hormones and their functions • Hormones produced by the gonads • The mechanism of hormone action • The mechanism of hormone action and their target organs • Neuroendocrine • Neurotransmitters	and Discussion		
4	The students understand the stages of the estrous cycle	Able to identify	Estrous Cycle • Folliculogenesis and luteolysis • Phases in the estrous cycle • Signs of estrous • Repeat breeder and long cycle	Tutorial, Presentation, and Discussion		
5	The students understand the hormonal conditions during the estrous cycle		Endocrinology during the estrous cycle • Ovary and hormonal conditions during proestrus • Ovary and hormonal conditions during estrous • Ovary and hormonal conditions in estrous			

			• Ovary and hormonal conditions in estrous			
6	The students are able to understand hormonal conditions during pregnancy and delivery	Able to identify	Endocrinology of pregnancy and delivery • Hormonal conditions during pregnancy • Hormonal changes during pregnancy • Hormonal changes before and during delivery (including Progesterone, Estrogen, PGF2α, Oxytocin) • Delivery process	Tutorial, Presentation, and Discussion		
7	The students are able to understand the process of spermatozoa travel to the fertilization process	Able to understand	Spermatozoa transport and fertilization • Spermatozoa transport in male reproductive organs (seminiferous tubules, epididymis, and ejaculate) • Spermatozoa transport in female reproductive organs (cervix, uterus, oviduct) • Changes in spermatozoa function (before capacitation, capacitation, and acrosome reactions) • Ovulation process • Maturation and ovum transport • Fertilization process	Tutorial, Presentation, Video, and Discussion		

			(fertilization stage)			
8	The students are able to understand embryonic development to the implantation process	Able to understand	Cleavage, determination, and differentiation ● Sex Determination ● The process of cell division in zygote ● Embryonic cell differentiation and early embryonic development ● Implantation process ● Factors affecting embryo travel to implantation ● The process of forming body organs	Tutorial, Presentation, Video, and Discussion		
9	The students are able to understand the lactation process and the puerperium The students understand the role of the parents in taking care of their children	Able to understand	Lactation and puerperium ● Lactation Process ● The role of lactation for reproduction ● The process of returning the reproductive organs post-partum ● The role of the prolactin hormone on the formation of milk, oxytocin on milk letdown, and the effects of prolactin on anestrus	Tutorial, Presentation, Video, and Discussion		
10	The students understand the reproductive	Able to understand	Reproductive in poultry	Tutorial, Presentation,		

	physiology of poultry		● Hen's reproductive organs ● Rooster's reproductive organs ● The process of producing spermatozoa and ovum	Video, and Discussion		
11	The students are able to understand embryonic development during the hatching process	Able to understand	Embryonic development in poultry ● Fertilization process in poultry ● Embryonic formation and development in poultry ● Factors affecting embryonic development	Tutorial, Presentation, Video, and Discussion		
12	The students are able to understand animal reproductive disorders and diseases	Able to understand	Reproductive disorders and failure ● Disorders of the estrous cycle (silent heat, short cycle, long cycle, and repeat breeding) ● Sub fertile and the affecting factors ● Sterile and the affecting factors ● Reproductive diseases that cause reproductive disorders and sterile	Tutorial, Presentation, Video, and Discussion		
13	The students understand the maintenance affecting	Able to understand	Reproductive efficiency ● Factors affecting reproductive efficiency	Tutorial, Presentation, and Discussion		

	reproductive efficiency		• Ways to increase reproductive efficiency • The effect of reproductive efficiency in the success of the livestock business			
14	The students are able to understand reproductive hormones, endocrinology of the estrous cycle, pregnancy and delivery, reproductive diseases and reproductive efficiency	Able to understand	Material review	Discussion	Activeness and Questions and Answers	

ASSESSMENT RUBRIC

	UNIVERSITY OF BRAWIJAYA FACULTY OF ANIMAL SCIENCE DEPARTMENT OF ANIMAL SCIENCE UNDERGRADUATE STUDY PROGRAM OF ANIMAL SCIENCE		
Course	Animal Reproduction Science		
Score Level	PLO and CLO	Conversion	PLO Score
Program Learning Outcomes 2: Able to demonstrate independent, quality, and measurable performance (both quality and quantity) effectively, efficiently, and sustainably (LO 7) Course Learning Outcomes 1: The students understand how to manage animals in order to achieve reproductive efficiency			
Very Good (4)	Showing a **comprehensive** understanding of concepts related to reproductive management to achieve reproductive efficiency in the animal sector	>80-100	1
Good (3)	Showing a **good** understanding of concepts related to reproductive management to achieve reproductive efficiency in the animal sector	>70-80	0.75
Moderate (2)	Showing a **limited** understanding of concepts related to reproductive management to achieve reproductive efficiency in the animal sector	>60-70	0.5
Poor (1)	Showing a **very limited** understanding of concepts related to reproductive management to achieve reproductive efficiency in the animal sector	≤60	0.25
Score Level	PLO and CLO	Conversion	PLO Score
Program Learning Outcomes 1: Able to apply biological science, physiology, nutrition science, breeding science, animal raising management to comprehend the concept and implement it in the field of animal science (LO 6) Course Learning Outcomes 2: The students are able to understand puberty and the factors that influence it, cement production, spermatozoa travel, fertilization and embryonic development			

Very Good (4)	Showing a **comprehensive** understanding of concepts related to puberty, cement production, spermatozoa travel, fertilization and embryonic development	>80-100	1
Good (3)	Showing a **good** understanding of concepts related to puberty, cement production, spermatozoa travel, fertilization and embryonic development	>70-80	0.75
Moderate (2)	Showing a **limited** understanding of concepts related to puberty, cement production, spermatozoa travel, fertilization and embryonic development	>60-70	0.5
Poor (1)	Showing a **very limited** understanding of concepts related to puberty, cement production, spermatozoa travel, fertilization and embryonic development	≤60	0.25
Score Level	PLO and CLO	Conversion	PLO Score
Program Learning Outcomes 1 and 3: ● Able to apply biological science, physiology, nutrition science, breeding science, animal raising management to comprehend the concept and implement it in the field of animal science (LO 6) ● Able to involve themselves in the learning process and discussion on an ongoing basis (LO 10) Course Learning Outcomes 3: The students are able to understand reproductive hormones and endocrinology of the estrous cycle, pregnancy, and delivery and lactation			
Very Good (4)	Showing a **comprehensive** understanding of concepts related to reproductive hormones and endocrinology of the estrous cycle, pregnancy, and delivery and lactation	>80-100	0.5
Good (3)	Showing a **good** understanding of concepts related to reproductive hormones and endocrinology of the estrous cycle, pregnancy, and delivery and lactation	>70-80	0.375
Moderate (2)	Showing a **limited** understanding of concepts related to reproductive hormones and endocrinology of the estrous cycle, pregnancy, and delivery and lactation	>60-70	0.25
Poor (1)	Showing a **very limited** understanding of concepts related to reproductive hormones	≤60	0.125

	and endocrinology of the estrous cycle, pregnancy, and delivery and lactation		
Program Learning Outcomes 1: Able to apply biological science, physiology, nutrition science, breeding science, animal raising management to comprehend the concept and implement it in the field of animal science (LO 6) Course Learning Outcomes 4: The students are able to understand reproductive physiology in poultry and embryonic development in poultry.			
Very Good (4)	Showing a **comprehensive** understanding of concepts related to reproductive physiology in poultry and embryonic development in poultry	>80-100	1
Good (3)	Showing a **good** understanding of concepts related to reproductive physiology in poultry and embryonic development in poultry	>70-80	0.75
Moderate (2)	Showing a **limited** understanding of concepts related to reproductive physiology in poultry and embryonic development in poultry	>60-70	0.5
Poor (1)	Showing a **very limited** understanding of concepts related to reproductive physiology in poultry and embryonic development in poultry	≤60	0.25
Program Learning Outcomes 2: Able to demonstrate independent, quality, and measurable performance (both quality and quantity) effectively, efficiently, and sustainably (LO 7) Course Learning Outcomes 5: The students are able to understand reproductive disorders			
Very Good (4)	Showing a **comprehensive** understanding of concepts related to reproductive disorders in animals	>80-100	1
Good (3)	Showing a **good** understanding of concepts related to reproductive disorders in animals	>70-80	0,75
Moderate (2)	Showing a **limited** understanding of concepts related to reproductive disorders in animals	>60-70	0,5
Poor (1)	Showing a **very limited** understanding of concepts related to reproductive disorders in animals	≤60	0,25

Formula to Calculate PLO Score: $\frac{Level\ Skor}{\sum level\ skor} \times \frac{\sum CLO}{\sum PLO}$

Lecture Portfolio

UNIVERSITY OF BRAWIJAYA

FACULTY OF ANIMAL SCIENCE

STUDY PROGRAM OF ANIMAL SCIENCE

Course: Animal Reproduction Science	Code: PEP 61007	RMK:	Semester: 3

Lecturers	1. Prof. Dr.Ir.Trinil Susilawati,MS, IPU, ASEAN Eng 2. Prof. Dr. Agr. Ir. Suyadi, MS, IPU, ASEAN Eng 3. Prof. Dr.Ir. Muhammad Nur Ihsan,MS 4. Prof. Dr.Ir. Woro busono,MS 5. Dr.Ir. Nurul Isnaini,MP 6. Dr.Ir. Sri Wahyuningsih,Msi 7. Dr. Achadiah Rahmawati, S.Pt, M.Si 8.Aulia Puspita Anugra Yekti,Spt,MP,Msc

Introduction (Describe the explanation needed about this course, the experiences that have been encountered)

This course discusses puberty in male animals, changes in the physiology of spermatozoa inside the male and female reproductive tracts, natural fertilization, embryonic development, pregnancy, delivery, the role of hormones in pregnancy and delivery, also explaining the stages of estrous, pregnant animal, delivery, endocrinology during the estrous cycle, pregnancy, and partus.

1	**Objectives** (Describe general and specific course objectives)
	1. The students understand how to manage animals in order to achieve reproductive efficiency 2. The students are able to understand puberty and the factors that influence it, cement production, spermatozoa travel, fertilization and embryonic development 3. The students are able to understand reproductive hormones and endocrinology of the estrous cycle, pregnancy, and delivery and lactation 4. The students are able to understand reproductive physiology in poultry and embryonic development in poultry 5. The students are able to understand reproductive disorders

2	**Learning Strategies** (Describe the strategy used to achieve the course objective - CLO)
	The learning strategies carried out in the lectures include lectures, discussions, structured assignments, quizzes, and group presentations
3	**Lecture Management** (Describe the lecture management: lectures, tutorials, practicum, assignments, major assignments, etc.)
	1) Lecture: 100 minutes/meeting (14 meetings) 2) Practicum of 150 minutes/meeting (14 meetings) 3) Structured assignments/quizzes/group presentation 4) Attendance: 80% of total attendance
4	**Lecture Contents** (explain its suitability with the applicable curriculum)
	1. Introduction ● The Relationship between Reproductive Science and other Sciences ● The role of Animal Science in a livestock business 2. Puberty and cement production ● Definition and signs of puberty in male and female animal ● The process of puberty (Target Weight Theory) ● Factors affecting puberty ● Libido and the factors that influence it ● Factors affecting cement production (genetic, management, and environmental) 3. Reproductive Endocrinology ● Differences in hormones, neurohormonal, and neurotransmitters ● Classification of hormone based on the material and function ● Glands that produce reproductive hormones and their functions ● Hormones produced by the gonads ● The mechanism of hormone action ● The mechanism of hormone action and their target organs ● Neuroendocrine ● Neurotransmitters 4. Estrous Cycle ● Folliculogenesis and luteolysis ● Phases in the estrous cycle ● Signs of estrous ● Repeat breeder and long cycle

	5. Endocrinology during the estrous cycle ● Ovary and hormonal conditions during proestrus ● Ovary and hormonal conditions during estrous ● Ovary and hormonal conditions in estrous ● Ovary and hormonal conditions in estrous 6. Endocrinology of pregnancy and delivery ● Hormonal conditions during pregnancy ● Hormonal changes during pregnancy ● Hormonal changes before and during delivery (including Progesterone, Estrogen, PGF2α, Oxytocin) ● Delivery process 7. Spermatozoa transport and fertilization ● Spermatozoa transport in male reproductive organs (seminiferous tubules, epididymis, and ejaculate) ● Spermatozoa transport in female reproductive organs (cervix, uterus, oviduct) ● Changes in spermatozoa function (before capacitation, capacitation, and acrosome reactions) ● Ovulation process ● Maturation and ovum transport ● Fertilization process (fertilization stage) 8. Cleavage, determination, and differentiation ● Sex Determination ● The process of cell division in zygote ● Embryonic cell differentiation and early embryonic development ● Implantation process ● Factors affecting embryo travel to implantation ● The process of forming body organs 9. Lactation and puerperium ● Lactation Process ● The role of lactation for reproduction ● The process of returning the reproductive organs post-partum ● The role of the prolactin hormone on the formation of milk, oxytocin on milk letdown, and the effects of prolactin on anestrus

	10. Reproductive physiology in poultry ● Hen's reproductive organs ● Rooster's reproductive organs ● The process of producing spermatozoa and ovum 11. Embryonic development in poultry ● Fertilization process in poultry ● Embryonic formation and development in poultry ● Factors affecting embryonic development 12. Reproductive disorders and failure ● Disorders of the estrous cycle (silent heat, short cycle, long cycle, and repeat breeding) ● Sub fertile and the affecting factors ● Sterile and the affecting factors ● Reproductive diseases that cause reproductive disorders and sterile 13. Reproductive efficiency ● Factors affecting reproductive efficiency ● Ways to increase reproductive efficiency ● The effect of reproductive efficiency in the success of the livestock business 14. Material Review ● Reproductive Hormones ● Endocrinology of the estrous cycle, pregnancy, and delivery ● Reproductive disorders ● Reproductive efficiency
5	**Lecture Participants** (provide an overview of the lecture participants)
	The course participants are 3rd semester students who have passed Biology, Animal Anatomy and Physiology courses
6	**Attendance Percentage** (% lecturer attendance; % student attendance)
	% lecturer attendance: 100% % student attendance: 80%
7	**Evaluation System** (explain the homework, quizzes, group assignments, practicum, etc.)
	Midterm Exam: 30% Final Exam: 30%

	Pass the Practicum Exam: 20% Structured Assignment/quiz: 20%
8	**Class Observation** (explain important and interesting things that were encountered during the lecture)
	Activeness in following discussions
9	**Learning Outcomes** (explain the achievement of the objectives that have been set, also include the learning achievements that can be explained)
	1. Able to apply biological science, physiology, nutrition science, breeding science, animal raising management to comprehend the concept and implement it in the field of animal science (LO 6) 2. Able to demonstrate independent, quality, and measurable performance (both quality and quantity) effectively, efficiently, and sustainably (LO 7) 3. Able to involve themselves in the learning process and discussion on an ongoing basis (LO 10)
10	**Obstacles** (provide an overview of the main obstacles in the learning process)
	Facilities for practicum are inadequate so that the practicum is mostly carried out in demonstrations, delays in disbursing practicum funds.
11	**Score Distribution** (provide the score distribution following the learning achievements of this course)
	Midterm Exam: 30% Final Exam: 30% Pass the Practicum Exam: 20% Structured Assignment/quiz: 20%
12	**Conclusion**
	In general, the implementation of teaching and learning of the Animal Reproduction Science course can run well in accordance with the plan, but it is necessary to improve laboratory facilities and funding to support practicum activities.
13	**Improvement Recommendations**
	1. Addition of laboratory facilities 2. On-time funding for practicum
	Appendices:
	1. 2. etc.