



Course Module
Departement of Animal Science
Faculty of Animal Science
Universitas Brawijaya

Module Name	Reproduction Technology
Module Level	Undergraduate Study Program of Animal Science
Code	PEP60020
Subtitle	-
Courses	Reproduction Technology
Semester (s)	6
Person responsible for the module	-
Lecturer	<ol style="list-style-type: none"> 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. Prof. Dr.Ir. Nurul Isnaini ,MP 6. Prof. Dr.Ir. Sri Wahyuningsih ,Msi 7. Dr.Achadiyah Rachmawati,Spt,MP 8. Aulia Puspita Anugra Yekti,Spt,MP,Msc
Language	Bahasa Indonesia, English
Relation to curriculum	Study Program: Animal Science Specialization: Animal Science Type: Compulsory /Non-Compulsory
Type of Teaching contact hours	Contact hours and class size separately for each teaching method: lecture, lesson, project, practical etc.
Workload	Courses : 90,67 hours/semester Practical : 1,70 hours/semester
Credit Weight	3 credits or 5.1 (ECTS)
Requirements according to the examination regulations	-
Recommended prerequisites	-
Requirements for Passing the Course	-
Prerequisite Courses	Reproductive Management and AI
Learning Outcomes	Learning Outcomes : <ol style="list-style-type: none"> 1. Capability to analyse the development and implementation of technology through humanities, ethical and scientific value as to provide appropriate solutions and ideas (LO5) 2. Capability to develop knowledge and comprehensive mindset based on Animal science and industry (LO4)

	<p>3. Capability to ethically design and perform experiments, analyze and interpret data as to provide sustainable problem solving in Animal Science (LO12)</p> <p>Course Learning Outcomes :</p> <p>After completing this course students are able to:</p> <ol style="list-style-type: none"> 1. Understand the reproductive technology in animals that have been developed today and in the future 2. Understand the role of reproductive technology in improving animal genetic quality and productivity 2. Know and understand the basic principles and applications of spermatozoa and embryo sexing techniques, embryo transfer, in vitro fertilization, embryo manipulation (cloning), chimeras, transgenic, and embryonic stem cells. 3. Apply the principles of gamete and embryo manipulation techniques properly 4. Prepare research students in the field of animal reproduction
	<p>Objectives: This course begins with Sexing technology then embryo transfer that includes estrus synchronization, multiple ovulation/ super ovulation, in vivo fertilization, in vitro fertilization, embryo manipulation, cloning, nuclear transfer and application of reproductive technology. Besides, students are required to attend practicum to achieve competence regarding gamete and embryo manipulation techniques and research in the field of livestock reproduction</p>
	<p>Knowledge: Understanding about livestock reproductive technology that have developed for current and future, Understanding the role of reproductive technology in improving the genetic quality of livestock and livestock productivity, Knowing and understanding the basic principles and applications of spermatozoa and embryo sexing techniques, embryo transfer, in vitro fertilization, embryo manipulation (cloning), chimeras, transgenic and embryonic steam cells</p>
	<p>Skills: cognitive- Able to apply the principles of gamete and embryo manipulation techniques correctly. Phsycomotoric Student prepare for research in the field of livestock reproduction</p>
	<p>Competences: Able to Sexing of spermatozoa and embryo, Embryo Transfer, Synchronization of estrus, superovulation, and artificial insemination, Collection technique and evaluation of embryo quality, In vitro oocyte maturation technology and in vitro fertilization technique, ELISA, RIA, and USG technology for detection of pregnancy and reproductive disorders, Embryo manipulation</p>

	technology, Reproductive technology application strategy in smallholder farms and animal industry.
Learning Content	<p>The topics include:</p> <ol style="list-style-type: none"> 1. Introduction <ul style="list-style-type: none"> ● The sciences that need to be learned to make it easier to learn the course of reproductive technology ● Relationship between the course of reproductive technology and other sciences ● Scope of the course of reproductive technology and its relationship in improving the genetic quality of animals ● Recent developments in the reproductive technology of animals 2. Sexing of spermatozoa and embryo: <ul style="list-style-type: none"> ● Definition and Basis of Sexing of Spermatozoa and Embryo ● Spermatozoa sexing techniques ● Sexing Using the Percoll Density Gradient Centrifugation (SGDP) Method ● Sexing Using the Sephadex Filtration Method ● Sexing Using Egg White Sedimentation Method ● Sexing Method in Embryo ● Sexing Method in Chickens 3. Embryo Transfer <ul style="list-style-type: none"> ● Definition, advantages, and disadvantages of embryo transfer ● History of embryo transfer ● Selection of the donor parent and recipient ● Stages of Embryo Transfer 4. Synchronization of estrus, superovulation, and artificial insemination <ul style="list-style-type: none"> ● The synchronization mechanism of estrus ● Techniques using various hormones to synchronize estrus ● Multiple Ovulation Principles ● Multiple Ovulation Technique using GnRH ● Multiple Ovulation Technique Using FSH and LH ● Multiple Ovulation Technique Using PMSG and HCG ● Artificial insemination for donors 5. Collection technique and evaluation of embryo quality <ul style="list-style-type: none"> ● Surgical Method Embryo Collection ● Non-Surgical Method Embryo Collection

- Embryo Quality Evaluation
6. Embryo Transfer Technique
 - Embryo Transfer Technique
 - Problems and Obstacles
 - Embryo Transfer Method
 - Implementation of Embryo Transfer
 7. Implementation of Embryo Transfer
 - Preparation of Embryo Transfer
 - Implementation of embryo transfer in the field
 - Factors Affecting the Success of TE
 8. In vitro oocyte maturation technology and in vitro fertilization technique
 - Purposes and Principles of in vitro Oocyte Maturation
 - In Vitro Oocyte Maturation Stages
 - Benefits of IVF in Animals
 - Preparation of Spermatozoa
 - Implementation of IVF
 - Post IVF Embryo Culture
 9. Oocyte and Embryo Cryopreservation
 - Objectives and Methods of Oocyte/Embryo Cryopreservation
 - Factors Affecting Oocyte and Embryo Cryopreservation Results
 - Oocyte Cryopreservation
 - Embryo Cryopreservation
 - Stages of Oocyte and Embryo Cryopreservation
 10. ELISA, RIA, and USG technology for detection of pregnancy and reproductive disorders
 - Principles of Elisa, RIA, and Ultrasound Technology for pregnancy detection
 - ELISA technology
 - RIA technology
 - Elisa and Ria Technology Application for Pregnancy and Reproductive Problems Examination
 - Ultrasound technology
 - Utilization of ultrasound for Pregnancy and Reproductive Problems Examination
 11. Embryo manipulation technology
 - Cloning (Definition, Objectives, Techniques, Strengths, and Weaknesses)

	<p>12. Embryo manipulation technology</p> <ul style="list-style-type: none"> ● Intra Cytoplasmic Sperm Injection (ICSI) (Definition, Purposes, Techniques, Strengths, and weaknesses) ● Chimera (Definition, Purposes, Techniques, Strengths, and weaknesses) ● Types and Examples of Chimera Technologies <p>13. Reproductive technology application strategy in smallholder farms and animal industry</p> <ul style="list-style-type: none"> ● Determination of Reproductive Technology ● Application of Artificial Insemination Technology ● Embryo Transfer Application <p>14. Examples of research in the field of animal reproduction</p>
<p>Study and examination requirements and forms of examination</p>	<ul style="list-style-type: none"> - Attendance >80% - The final score of all the components of the PBM evaluation >44 <p>The final score component:</p> <ul style="list-style-type: none"> - 30% Midterm Exam - 30% Final Exam - 20% Practicu - 10% Structured Assignments - 10% Quiz <p>A : 80 < Final Score ≤ 100 B+ : 75 < Final Score ≤ 80 B : 69 < Final Score ≤ 75 C+ : 60 < Final Score ≤ 69 C : 55 < Final Score ≤ 60 D : 50 < Final Score ≤ 55 D+ : 44 < Final Score ≤ 50</p>
<p>Test Terms and Forms</p>	<p>Examination requirements: A minimum of 80% attendance to attend the final exam</p> <p>Forms of examination: Multiple choices and Essay</p>
<p>Learning Media</p>	<p>Projector and screen, Zoom application, Google Classroom, e-book, WA Group</p>
<p>References</p>	<ol style="list-style-type: none"> 1. Textbooks of Reproductive Technology (Sri Wahjuningsih, et al., 2019) 2. Farm Animal Reproduction (Hafez and Hafez, 2000)