COURSE LEARNING PLAN

	UNIVERSITY OF BRAWIJAYA FACULTY OF ANIMAL SCIENCE DEPARTMENT OF ANIMAL SCIENCE UNDERGRADUATE STUDY PROGRAM OF ANIMAL SCIENCE LEARNING PLAN: DAIRY PRODUCTION

Course	Code	Weight (credits)	Semester	Compilation Date
Dairy Production	PEP61003	3 (2-1)	3	July 25, 2020

Authorization	Supervising Lecturer	Head of Undergraduate Study Program of Animal Science	Vice Dean 1
	Dr. Ir. Puguh Surjowardojo, MS.	Dr. Herly Evanuarini, S.Pt., MP	Dr. M. Halim Natsir, S.Pt., MP., IPU., ASEAN Eng

Learning Outcomes (LO)	PLO
	LO-3: Demonstrate attitudes of friendly and caring about animal welfare and permissible *(halal)* consumption LO-5: Able to examine the implications of the development or implementation of science and technology that consider and apply humanities values in accordance with their expertise based on scientific principles, procedures, and ethics to produce excellent solutions and ideas LO-6: 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-10: Able to involve themselves in the learning process and discussion on an ongoing basis
	CLO
	1. Able to identify various types of dairy cattle (LO6) 2. Able to explain animal production systems that are suitable to be applied to certain regional conditions and provide benefits to farmers and the environment (LO3, LO5, and LO6) 3. Able to check the quality of fresh milk physically, chemically and organoleptically (LO5 and LO10) 4. Be able to mention and explain the factors that affect the quantity and quality of dairy cattle production (LO5, LO6 and LO10) 5. Able to analyze the dairy animal production system to increase the productivity of dairy animals (LO5, LO6, LO10)
Brief Course Description	This course consists the business potential and development of dairy cattle, dairy breeds, the environmental adaptability of various dairy breeds, the components of milk and the nutritional value of milk as a human food ingredient, the physical and chemical properties of milk, lactation biology, milk biosynthesis, factors affecting milk production and quality as well as lactation dynamics.
Topics	1. Introduction 2. Business potential and development of dairy animals 3. Dairy breeds 4. The environmental adaptability of various dairy breeds 5. Components and nutritional value of milk as a human food ingredient 6. Physical and chemical properties of milk 7. Lactation biology 8. Milk biosynthesis 9. Factors affecting dairy milk production 10. Lactation dynamics

<table>
<tr><td>References</td><td colspan="2">Campbell,R.S and R.T.Marshall, 1975, The Science of Providing Milk for Man, Mc.Graw-Hill Book Company, New York
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Webster,J., 1987, Understanding Dairy Cow, Billing and Sins Ltd, Worcester.</td></tr>
<tr><td rowspan="2">Learning Media</td><td>Software</td><td>Hardware</td></tr>
<tr><td>PPT, Video, E-modul, E-book</td><td>Staff handbook, handbook, Props, Animals</td></tr>
<tr><td>Teaching Team</td><td colspan="2">Dr. Ir. Puguh Surjowardojo, MS
Dr. Ir. Tri Eko Susilorini, MP, IPM, ASEAN Eng.
Firmansyah Tri Syahputra, S.Pt., MP., M.Sc
Aswah Ridhowi, S.Pt., MP., M.Sc</td></tr>
<tr><td>Prerequisite courses</td><td colspan="2">Animal Anatomy and Physiology
Animal Behavior
Laboratory Technique and Analysis</td></tr>
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The Schedule of Weekly Activities

Week (s)	Sub-Course Learning Outcomes (SCLO)	Indicators	Learning Materials/ Topics	Learning Methods	Criteria & Form of Assessment	Weighted Scores (%)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1	Introduction Able to understand course descriptions and understand lecture rules for one semester	Able to take lectures according to schedule (attending lectures 80%, attending practicum 100%, submit 100% structured assignments, attend quizzes, and be present at exams)	1. Subject scope, lecture rules, lecture assessments, practicum, delivery of schedules and assignments, and quizzes	Face to face or online	Attendance and student activeness	6
2	Business potential and development of dairy cattle	Able to describe the role of dairy cattle in human life, the potential for dairy farming in tropical areas and the need for the development of dairy animals in tropical areas.	1. The importance of dairy animals for human life 2. The potential for dairy farming in tropical areas 3. The need for dairy farming in tropical areas	Face to face or online	Attendance and student activeness	7
3	Components and nutritional value of milk as a human food ingredient	Able to mention the constituent components of milk. Able to describe the benefits of the nutritional value components of milk as a human food ingredient	1. The role of the nutritional components of milk for humans 2. The need for the nutritional component of milk in humans 3. Impact of nutritional deficiencies in milk	Face to face or online	Attendance and student activeness	7
4	Physical and chemical properties of milk	Able to mention the requirements for healthy milk based on the physical and chemical properties of the milk Able to distinguish and identify the physical and chemical properties of milk	1. protein, fat, lactose, amino acids, fatty acids, vitamins and minerals in milk 2. Physical and chemical properties of milk and the analysis 3. Assignment 4. Practicum (laboratory)	Face to face or online	Attendance and student activeness	7

5	Production potential and environmental adaptability of various dairy breeds (Dairy Cows)	Able to describe and differentiate dairy cows from tropical and sub-tropical regions	1. Dairy cows in topical and sub-tropical areas, potential for milk production, and adaptability 2. Practicum (field)	Face to face or online	Attendance and student activeness	7
6	Production potential and environmental adaptability of various dairy cattle breeds (Dairy Goats, Dairy Sheep)	Able to name and differentiate dairy cows from tropical and sub-tropical regions	1. Topical and sub-tropical areas of dairy goats and sheep, potential for milk production, and adaptability 2. Practicum (Laboratory and field)	Face to face or online	Attendance and student activeness	7
7	Lactation biology (Mammogenesis, Lactogenesis, Galactopoesis)	Able to explain development stages from embryo to lactation Able to mention the hormones involved in the process of mammogenesis, lactogenesis, and galactopoesis	1. Mammogenesis (development of the udder glands) 2. Lactogenesis (Lactation initiation) 3. Galactopoesis (maintenance of lactation) 4. Udder Anatomy	Face to face or online	Attendance and student activeness	7
8	Milk biosynthesis (Fat)	Able to explain the fat biosynthesis process	1. Milk biosynthesis (Fat)	Face to face or online	Attendance and student activeness	7
9	Milk biosynthesis (Protein and Lactose)	Able to explain the protein and lactose biosynthesis process	1. Biosynthesis of milk (Protein and Lactose)	Face to face or online	Attendance and student activeness	7
10	Factors affecting milk production and quality (Nation, Lactation Rate, Lactation Month)	Able to mention and explain the factors that affect milk production and quality.	1. Animal genetics 2. Lactation rate 3. Lactation month 4. Pregnancy 5. Lactation curve	Face to face or online	Attendance and student activeness	8
11	Factors affecting milk production and quality (Temperature, Feed, Dry Period)	Be able to name and explain the factors that affect milk production and quality.	1. Temperature and humidity, 2. Feed (early, middle, late lactation)	Face to face or online	Attendance and student activeness	8

			3. Drying technique, Steaming up			
12	Factors affecting milk production and quality (Milking, Disease)	Able to name and explain the factors that affect milk production and quality.	1. Milking technique, milking interval and frequency 2. Lactation dynamics 3. Milk let Down	Face to face or online	Attendance and student activeness	8
13	Body Condition Score (BCS) and Negative Energy Balance (NEB) Factors	Able to conduct BCS assessment and explain the relationship with NEB	1. BCS assessment 2. Negative Energy Balance	Face to face or online	Attendance and student activeness	7
14	Diseases in Dairy Cows	Able to identify various metabolic and non-metabolic diseases in dairy cattle	1. Metabolic Diseases 2. Diseases caused by microorganisms (bacteria and viruses)	Face to face or online	Attendance and student activeness	7

ASSESSMENT RUBRIC

	UNIVERSITY OF BRAWIJAYA FACULTY OF ANIMAL SCIENCE DEPARTMENT OF ANIMAL SCIENCE UNDERGRADUATE STUDY PROGRAM OF ANIMAL SCIENCE		
Course	Dairy Production		
Score Level	CLO and PLO	Conversion	PLO score
PLO 6: 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 CLO 1: Able to identify various types of dairy animals			
Very Good (4)	Showing ability to identify different types of dairy cattle **comprehensively**	>80-100	1
Good (3)	Showing ability to identify different types of dairy cattle **well**	>70-80	0.75
Moderate (2)	Showing **limited** ability to identify different types of dairy cattle	>60-70	0.5
Poor (1)	Showing **very limited** ability to identify different types of dairy cattle	<60	0.25
Score Level	CLO and PLO	Conversion	PLO score
PLO-3: Demonstrate attitudes of friendly and caring about animal welfare and permissible *(halal)* consumption PLO-5: Able to examine the implications of the development or implementation of science and technology that consider and apply humanities values in accordance with their expertise based on scientific principles, procedures, and ethics to produce excellent solutions and ideas PLO-6: 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 CLO 2: Able to check the quality of fresh milk physically, chemically, and organoleptically			
Very Good (4)	Showing a **comprehensive** understanding of concepts related to quality test of fresh milk physically, chemically, and organoleptically	>80-100	
Good (3)	Showing a **good** understanding of concepts related to quality test of fresh milk physically, chemically, and organoleptically	>70-80	
Moderate (2)	Showing a **limited** understanding of concepts related to quality test of fresh milk physically, chemically, and organoleptically	>60-70	
Poor (1)	Showing a **very limited** understanding of concepts related to quality test of fresh milk physically, chemically, and organoleptically	<60	
Score Level	CLO and PLO	Conversion	PLO score
PLO-5: Able to examine the implications of the development or implementation of science and technology that consider and apply humanities values in accordance with their expertise based on scientific principles, procedures, and ethics to produce excellent solutions and ideas			

PLO-10: Able to involve themselves in the learning process and discussion on an ongoing basis CLO 3: Able to mention and explain the factors that affect the quantity and quality of dairy animal production			
Very Good (4)	Show a **comprehensive** understanding of concepts related to the factors that affect the quantity and quality of dairy cattle production	>80-100	0.5
Good (3)	Show a **good** understanding of concepts related to the factors that affect the quantity and quality of dairy cattle production	>70-80	0.375
Moderate (2)	Show a **limited** understanding of concepts related to the factors that affect the quantity and quality of dairy cattle production	>60-70	0.25
Poor (1)	Show a **very limited** understanding of concepts related to the factors that affect the quantity and quality of dairy cattle production	<60	0.125
Score Level	CLO and PLO	Conversion	PLO score
PLO-5: Able to examine the implications of the development or implementation of science and technology that consider and apply humanities values in accordance with their expertise based on scientific principles, procedures, and ethics to produce excellent solutions and ideas PLO-6: 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. PLO-10: Able to involve themselves in the learning process and discussion on an ongoing basis CLO 4: Able to analyze dairy animal production systems to increase the productivity of dairy animals			
Very Good (4)	Showing a **comprehensive** understanding of concepts related to the analysis of dairy production systems to increase dairy productivity	>80-100	
Good (3)	Showing a **good** understanding of concepts related to the analysis of dairy production systems to increase dairy productivity	>70-80	
Moderate (2)	Showing a **limited** understanding of concepts related to the analysis of dairy production systems to increase dairy productivity	>60-70	
Poor (1)	Showing a **very limited** understanding of concepts related to the analysis of dairy production systems to increase dairy productivity	<60	
Score Level	CLO and PLO	Conversion	PLO score
PLO-5: Able to examine the implications of the development or implementation of science and technology that consider and apply humanities values in			

accordance with their expertise based on scientific principles, procedures, and ethics to produce excellent solutions and ideas PLO-6: 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. PLO-10: Able to involve themselves in the learning process and discussion on an ongoing basis CLO 5: Able to choose which animal production system is most suitable to be applied to the conditions of a particular area that provides the best benefit for the farmer and the environment			
Very Good (4)	Showing a **comprehensive** conceptual understanding of which animal production system is most suitable to apply to specific regional conditions that provide the best benefits for farmers and the environment	>80-100	
Good (3)	Showing a **good** conceptual understanding of which animal production system is most suitable to apply to specific regional conditions that provide the best benefits for farmers and the environment	>70-80	
Moderate (2)	Showing a **limited** conceptual understanding of which animal production system is most suitable to apply to specific regional conditions that provide the best benefits for farmers and the environment	>60-70	
Poor (1)	Showing **very limited** conceptual understanding of which animal production system is most suitable to apply to specific regional conditions that provide the best benefits for farmers and the environment	<60	

PLO Score Calculation: $\frac{Level\ Skor}{\sum level\ skor} \times \frac{\sum CLO}{\sum PLO}$

CLO Score Calculation

Components assessed	Component Weights	CLO Weight on the Score				
		CLO 1	CLO 2	CLO 3	CLO 4	CLO 5
Midterm Exam	0.30	0.2	0.2	0.2	0.2	0.2
Final Exam	0.30	0.2	0.2	0.2	0.2	0.2
Practicum exam	0.20	0.20	0.20	0.20	0.20	0.20
Individual structured assignment Quiz	0.20		0.25	0.25	0.25	0.25

CLO Weight						

The orange one must be filled by the supervisory team

Filling Steps:

1. The assessment component = any components will be assessed in one course (for example Midterm Exam, Final Exam, quiz percentages, etc.)
2. Component weight = Determine the weight of each component where the total of all components is 1.
3. Weight of CLO score
    a. Show the number of CLO in each subject (for example, the Animal Feed Industry course has 4 CLOs).
    b. Determine the components of the assessment aimed at achieving any number of CLO
    c. The total weight of the CLO score for each component is 1

PLO Score Calculation

CLO	CLO Score	CLO Weight	PLO			
			PLO 3	PLO 5	PLO 6	PLO 10
CLO 1					1	
CLO 2			0.33	0.33	0.34	
CLO 3				0.5		0.5
CLO 4				0.33	0.33	0.34
				0.33	0.33	0.34

The orange one must be filled by the supervisory team

Filling Steps:

1. CLO = write down the amount of CLO in each course (refer to the previous table)
2. PLO = Write down the number of PLO in each course based on the RPS
4. PLO Weight

a. Show the number of PLO in each subject (for example, the Animal Feed Industry course has 3 PLOs.

b. Determine the components of the assessment aimed at achieving any PLO number

c. The total weight of the PLO score for each component is 1

Lecture Portfolio

	UNIVERSITY OF BRAWIJAYA **FACULTY OF ANIMAL SCIENCE** **STUDY PROGRAM OF ANIMAL SCIENCE**		
Course: Dairy Production	Code: PEP61003	RMK:	Semester: 3
Lecturers	Dr. Ir. Puguh Surjowardojo, MP Dr. Ir. Tri Eko Susilorini, MP., IPM., ASEAN Eng Firmansyah Tri Syahputra, S.Pt., MP., M.Sc Aswah Ridhowi, S.Pt., MP., M.Sc		

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

This course studies the business potential and development of dairy cattle, dairy breeds, the environmental adaptability of various dairy breeds, the components of milk and the nutritional value of milk as a human food ingredient, the physical and chemical properties of milk, lactation biology, milk biosynthesis, factors affecting milk production and quality as well as lactation dynamics.

1	**Objectives** (Describe general or specific course objectives)
	1. Able to distinguish various types of dairy cattle 2. Able to check the quality of fresh milk physically, chemically and organoleptically 3. Able to mention and explain the factors that affect the quantity and quality of dairy animal production. 4. Able to analyze dairy animal production systems to increase the productivity of dairy animals 5. Able to choose which animal production system is most suitable to be applied to the conditions of a particular area that provides the best benefit for the farmer and the environment
2	**Learning Strategy** (Describe the strategies used to achieve course objectives - CLO)
	The learning strategy is conducted by giving lectures, discussions, quizzes, structured assignments, group presentation assignments, practicum, Midterm test and Final Test
3	**Lecture Management** (Describe the management of lectures: lectures, tutorials, practicum, assignments, major assignments, etc.)
	1. The lecture is conducted for 2x50 minutes for 14 meetings 2. Practicum is carried out 1x50 minutes for 14 meetings 3. Structured assignments/Quizzes/group presentations
4	**Lecture Contents** (Explain the suitability with the applicable curriculum)
	1. Introduction 2. Business potential and development of dairy animals 3. Dairy breeds 4. The environmental adaptability of various dairy breeds 5. Components and nutritional value of milk as a human food ingredient

	6. Physical and chemical properties of milk 7. Lactation biology 8. Milk biosynthesis 9. Factors affecting dairy milk production 10. Lactation dynamics
5	**Lecture Participants** (provide an overview of lecture participants)
	The lecture participants are Animal Science Faculty students who have passed the courses, Animal Anatomy and Physiology, Animal Behavior and Laboratory Technique and Analysis
6	**Attendance Percentage** (% attendance of lecturers; % attendance of students)
	Lecturer attendance percentage: 100% Student attendance percentage: at least 80%
7	**Evaluation System** (explain homework, quizzes, group assignments, practicum, etc.)
	1. The practicum is held 14 meetings with a duration of 1x50 minutes/meeting by testing the quality of milk and field practicum in the Sumber Sekar Field Lab 2. Quiz is conducted at the end of Mid-Semester and End-Semester meetings 3. Structured assignments/group presentations are given at least once in one semester
8	**Class Observation** (explain important and interesting things encountered during the lecture)
9	**Learning Outcomes** (explain the achievement of the goals that have been set including learning achievements that can be explained)
	1. Able to identify various types of dairy cattle (LO6) 2. Able to explain animal production systems that are suitable to be applied to certain regional conditions and provide benefits to farmers and the environment (LO3, LO5, and LO6) 3. Able to check the quality of fresh milk physically, chemically and organoleptically (LO5 and LO10) 4. Able to mention and explain the factors that affect the quantity and quality of dairy animal production (LO5, LO6 and LO10) 5. Able to analyze the dairy animal production system to increase the productivity of dairy animals (LO5, LO6, LO10)
10	**Obstacles** (provide an overview of the main obstacles in learning)
	Limitations of both laboratory and field practicum facilities.
11	**Score Distribution** (provide the score distribution following the learning outcome of this course)
	Midterm Exam: 30% Final Exam: 30% Practicum Exam: 20% Structured Assignment/Quiz: 20%
12	**Conclusion**
13	**Improvement Recommendations**

	Appendices:
	1. 2. etc.