


COURSE LEARNING PLAN

	UNIVERSITY OF BRAWIJAYA FACULTY OF ANIMAL SCIENCE DEPARTMENT OF ANIMAL SCIENCE UNDERGRADUATE STUDY PROGRAM OF ANIMAL SCIENCE LESSON PLAN: SCIENCE AND TECHNOLOGY OF FEED STUFF			
Course	Code	Weight (credits)	Semester	Compilation Date
Science and Technology of Feed Stuff	PEN	2-1 credit	4 (Four)	August 26, 2020
Authorization	Supervising Lecturer		Head of Undergraduate Study Program of Animal Science	Vice Dean 1
	Dr.Ir. Eko Widodo, M.Agr.Sc. M.Sc.		Dr. Herly Evanuarini, S.Pt, MP	Dr.M.Halim Natsir, S.Pt, MP. IPM. ASEAN Eng
Learning Outcomes (LO)	PLO (LO 1, LO 2, LO 4, LO 7)			
	<div>1. 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</div> <div>2. LO 11: Able to show performance, both independently and in teamwork (inter- and multi-disciplinary), identify and analyze to solve problems in quality and measurable way</div> <div>3. LO 12: Able to design and conduct experiments, analyze and interpret data to make correct decisions in solving problems in the field of animal science, meet ethics, and have environmental insight</div>			
	CLO			
	<div>1. Able to understand and explain the animal feed processing technology, agricultural waste, and concentrates</div>			

	<ol style="list-style-type: none"> 2. Able to apply the animal feed processing technology and physical, chemical, and biological agricultural waste. 3. Able to apply physical, chemical, and biological concentrate feed ingredients processing technology. 4. Able to evaluate the physical, chemical, and biological results of the application of animal feed processing technology
Brief Course Description	<p>This course discusses:</p> <p>Characteristics and structure of animal feed materials, agricultural waste and concentrates, physical, chemical, and biological animal feed processing technology, as well as the use of industrial by-product and biotechnology, as well as feed additive manufacturing technology</p>
Topics	<ol style="list-style-type: none"> 1. Characteristics and Processing Technology of Animal Feed and Agricultural Waste 2. Physical Animal Feed Processing Technology for Animal Feed and Agricultural Waste 3. Animal Feed and Agricultural Waste Processing Technology Chemically (Treatment with acids (SO₂ dan Cl) and alkalis (NaOH, KOH, Ca (OH)₂, NH₃, NH₄(OH), Urea) 4. Animal Feed Processing Technology and Biological Agricultural Waste (Fungi, Enzymes, Bacteria, Mold) 5. Combination of Animal Feed Processing Technology and Agricultural Waste 6. Animal Feed and Agricultural Waste Supplementation Technology (Urea Mollases Block (UMB) and Complete Feed) 7. Mechanical Processing Technology of Concentrate Animal Feed (seed structure, mechanical processing, and nutrient alteration) 8. Physical Processing Technology of Concentrate Animal Feed 9. Processing technology and use of concentrate Animal Feed from the by-product industry 10. Biological Processing Technology of Concentrate Feed 11. Concentrate Feed of Feed Additive Technology for Non-ruminant Animal Applications 12. Damage to concentrate animal feed during storage
References	<ol style="list-style-type: none"> 1. Buku Teknologi Pengolahan Bahan Pakan, UB Press. 2019 (M. Halim Natsir dkk) 2. Chemistry and Technology of Cereals as Food and Feed. Avi Book. 1991. (Samuel A Matz) 3. Tropical Animal Feed Plants: Development and Use CRC Press. 2000. (W.D. Pitman dan A. Sotomayor-Rios)

	4. Animal Feed Crops of the World, Volume 1: Major Animal Feed Crops. Apple Academic Press. 2019. (Md Hedayetullah and P. Zaman)					
Learning Media	Software			Hardware		
	<ul style="list-style-type: none">- Video- Powerpoint- Articles- Reference book			<ul style="list-style-type: none">- Laptop- LCD		
Teaching Team	<ul style="list-style-type: none">1. Dr.Ir. Eko Widodo, M.Agr.Sc. M.Sc. (Koordinator)2. Prof. Dr.Ir. Siti Chuzaemi, MS. IPU ASEAN Eng3. Prof. Dr.Ir. Hartutik, MP. IPU. ASEAN Eng4. Prof. Dr.Ir. Kusmartono5. Dr. Ir. Osfar Sjojfan, M.Sc. IPU. ASEAN Eng6. Dr.Ir. Irfan H. Djunaidi, MP. IPM. ASEAN Eng7. Dr.Ir. M. Halim Natsir, MP. IPM. ASEAN Eng8. Artharini Irsyammawati, SPt.MP9. Yuli Frita Nuningtyas, SPt.M.Sc.MP10. Poespitasari Hasanah N, SPt. MP.					
Prerequisite course						
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	Able to understand the variety of animal feed and their applications for the development of the use of animal feed	Able to explain the variety of animal feed and their applications for the development of	Introduction -Semester Course Outline & Lesson Plans (RPKPS), Lecture contract - Review of feed ingredients	Lectures and discussions	Midterm Exam	


		the use of animal feed	IPTBPB development trends -The development of the use of feed ingredients in the community			
2	Able to understand the characteristics and basics of Animal Feed Processing Technology and Agricultural Waste	Able to explain the characteristics and basics of Animal Feed Processing Technology and Agricultural Waste	-Characteristics of animal feed and agricultural waste - Introduction to Physical Processing Technology for Animal Feed and Agricultural Waste - Introduction to Chemical Processing Technology of Animal Feed and Agricultural Waste - Biological Processing Technology of Animal Feed and Agricultural Waste	Lectures and discussions	Midterm Exam	
3	Able to understand and apply physical animal feed processing technology	Able to analyze the use of physical animal feed processing technology and its application	Animal Feed and Agricultural Waste Processing Technology (Chopping, Grinding, Shredding) Animal Feed and Agricultural Waste	Lectures and discussions	Midterm Exam	

			Processing Technology (Ion Radiation, High-Pressure Heating)			
4	Able to understand and apply chemical animal feed processing technology	Able to analyze the use of chemical animal feed processing technology and its application	Animal Feed and Agricultural Waste Processing Technology Chemically (Acid Treatment (SO ₂ and Cl) Animal Feed and Agricultural Waste Processing Technology alkalis (NaOH, KOH, Ca (OH) ₂ , NH ₃ , NH ₄ (OH), Urea)	Lectures and discussions	Midterm Exam	
5	Able to understand and apply biological animal feed processing technology	Able to analyze the use of biological animal feed processing technology and its application	Animal Feed Processing Technology and Biological Agricultural Waste (Fungi, Enzymes, Bacteria, Mold)	Lectures and discussions	Structured Assignments and Midterm Exam	
6	Able to understand and apply a combination of animal feed processing technology	Able to analyze the use of feed material processing technology in a combination (physical, chemical, and	Combination of Animal Feed Processing Technology and Agricultural Waste.	Lectures and discussions	Quizzes and Midterm Exam	

		biological) and its application				
7	Able to understand and apply animal feed supplementation technology and agricultural waste	Able to explain the theory and application of animal feed supplementation technology and agricultural waste	Animal Feed and Agricultural Waste Supplementation Technology (Urea Mollases Block (UMB) and Complete Feed)	Lectures and discussions	Midterm Exam	
8	Midterm Exam					
9	Able to understand and apply mechanical processing technology for concentrate animal feed	Able to explain and apply mechanical processing technology for concentrate animal feed	Feed Material Mechanical Processing Technology for Concentrate Animal Feed (seed structure, mechanical processing, and nutrient alteration)	Lectures and discussions	Final Exam	
10	Able to understand and apply physical processing technology for concentrate animal feed	Able to explain and apply physical processing technology for concentrate animal feed	Physical processing technology for concentrate animal feed	Lectures and discussions	Final Exam	
11	Able to understand and apply processing technology and the use of concentrate feed from the by-product industry	Able to explain and apply processing technology and the use of concentrate feed from the	Processing technology and the use of concentrate feed from the by-product industry (DDGS, CGM, etc)	Lectures and discussions	Final Exam	

		by-product industry				
12	Able to understand and apply concentrate feed biological processing technology	Able to explain and apply concentrate feed biological processing technology	Concentrate Feed Biological Processing Technology (use of enzymes, fermentation)	Lectures and discussions	Structured Assignments and Final Exam	
13	Able to understand and apply concentrate feed of feed additive technology for non-ruminant animal applications	Able to explain and apply concentrate feed of feed additive technology for non-ruminant animal applications	Feed Additive Technology of Concentrated Feed (probiotic, prebiotic, synbiotic, phytobiotic, acidifier, essential oil) for non-ruminant animal applications	Lectures and discussions	Quizzes and Final Exam	
14	Able to understand and apply the mechanism of damage to animal feed and their handling	Able to explain the theory and application as well as the mechanism of damage to animal feed and their handling	Damage to Concentrate Feed During Storage	Lectures and discussions	Final Exam	
15	Able to understand and present the latest concentrate animal feed processing technology	Able to explain new discoveries from the latest journals related to concentrate animal feed processing	Present the latest discoveries from the latest journals related to concentrate animal feed processing	Presentation and discussions	Final Exam	
16	FINAL EXAM					

RUBRICS FOR ASSESSMENT

	UNIVERSITY OF BRAWIJAYA FACULTY OF ANIMAL SCIENCE DEPARTMENT OF ANIMAL SCIENCE UNDERGRADUATE STUDY PROGRAM OF ANIMAL SCIENCE		
Course	SCIENCE AND TECHNOLOGY OF FEED STUFF		
Score Level	CLO and PLO	Conversion	PLO score
Learning Outcomes:			

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 CLO 1: Able to understand and explain animal feed processing technology, agricultural waste, and concentrates			
Very Good (4)	Show the ability to develop and implement comprehensive technological science on the characteristics of animal feed, agricultural waste and concentrates.	80-100	
Good (3)	Show the ability to develop and implement proper technological science on the characteristics of animal feed, agricultural waste and concentrates.	70-79	
Moderate (2)	Show the ability to develop and implement technological science quite well on the characteristics of animal feed, agricultural waste and concentrates.	60-69	
Poor (1)	Show the ability to develop and implement poor technological science on the characteristics of animal feed, agricultural waste and concentrates.	<60	
Score Level	CLO and PLO	Conversion	PLO score
Program Learning Outcomes 1:			

<p>PLO 11: Able to show performance, both independently and in teamwork (inter- and multi-disciplinary), identify and analyze to solve problems in quality and measurable way</p> <p>PLO 12: Able to design and conduct experiments, analyze and interpret data to make correct decisions in solving problems in the field of animal science, meet ethics, and have environmental insight</p> <p>CLO 2: Able to apply the animal feed processing technology and physical, chemical, and biological agricultural waste</p>			
Very Good (4)	Show the ability to comprehensively identify, analyze, design, and implement physical, chemical, and biological animal feed processing technologies (animal feed, agricultural waste and concentrates).	80-100	
Good (3)	Show the ability to properly identify, analyze, design, and implement physical, chemical, and biological animal feed processing technologies (animal feed, agricultural waste and concentrates).	70-79	
Moderate (2)	Show the ability to identify, analyze, design, and implement physical, chemical, and biological animal feed processing technologies (animal feed, agricultural waste and concentrates) quite well	60-69	
Poor (1)	Show poor ability to identify, analyze, design, and implement physical, chemical, and biological animal feed processing	<60	

	technologies (animal feed, agricultural waste and concentrates)		
Score Level	CLO and PLO	Conversion	PLO score
<p>Program Learning Outcomes 1:</p> <p>PLO 11: Able to show performance, both independently and in teamwork (inter- and multi-disciplinary), identify and analyze to solve problems in quality and measurable way</p> <p>PLO 12: Able to design and conduct experiments, analyze and interpret data to make correct decisions in solving problems in the field of animal science, meet ethics, and have environmental insight</p> <p>CLO 3: Able to apply physical, chemical and biological concentrate feed materials processing technology.</p>			
Very Good (4)	Show the ability to comprehensively identify, analyze, design, and implement physical, chemical, and biological concentrate animal feed processing technologies.	80-100	
Good (3)	Show the ability to properly identify, analyze, design, and implement physical, chemical, and biological concentrate animal feed processing technologies.	70-79	
Moderate (2)	Show the ability to identify, analyze, design, and implement physical, chemical, and biological concentrate animal feed processing technologies quite well	60-69	

Poor (1)	Show poor ability to identify, analyze, design, and implement physical, chemical, and biological concentrate animal feed processing technologies.	<60	
Score Level	CLO and PLO	Conversion	PLO score
<p>Program Learning Outcomes 1:</p> <p>PLO 12: Able to design and conduct experiments, analyze and interpret data to make correct decisions in solving problems in the field of animal science, meet ethics, and have environmental insight.</p> <p>CLO 4: Able to evaluate the physical, chemical, and biological results of the application of animal feed processing technology</p>			
Very Good (4)	Have the ability to comprehensively evaluate the results of the application of animal feed processing technology physically, chemically, and biologically.	80-100	
Good (3)	Have the ability to properly evaluate the results of the application of animal feed processing technology physically, chemically, and biologically.	70-79	
Moderate (2)	Have the ability to evaluate the results of the application of animal feed processing technology physically, chemically, and biologically quite well	60-69	
Poor (1)	Have poor ability to evaluate the results of the application of animal feed	<60	

	processing technology physically, chemically, and biologically		
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How to Calculate the PLO Score : $\frac{\text{Score Level}}{\sum \text{Score Level}} \times \frac{\sum \text{CLO}}{\sum \text{PLO}} \frac{\text{Score Level}}{\sum \text{Score Level}} \times \frac{\sum \text{CLO}}{\sum \text{PLO}}$

Calculation of CLO Score

Components assessed	Component Weights	CLO Weight against Score			
		CLO 1	CLO 2	CLO 3	CLO 4
Practicum	0.2	0.1	0.4	0.3	0.2
Midterm Exam	0.35	0.3	0.7		
Final Exam	0.35			0.6	0.4
Assignments	0.05	0.2	0.3	0.3	0.2
Quizzes	0.05	0.2	0.3	0.3	0.2
CLO WEIGHT					

The orange one must be filled by the supervisory team

Filling Steps:

1. Components of assessment = any components that will be assessed in one course (For example, Midterm exam, Final Exam, Presentation, Quizzes, etc)

2. Component Weights = Determine the weight of each component where the total of all components is 1.
3. CLO Weight against Score
 - a. Show the number of CLO in each course (for example, the animal feed industry course has 4 CLO).
 - b. Determine the component of assessment aims to achieve any CLO number
 - c. The total weight of the CLO score for each component is 1

Calculation of PLO Score

CLO	CLO Score	CLO Weight	PLO		
			CLO 5	CLO 11	CLO 12
CLO 1			1.0		
CLO 2				0.4	0.6
CLO 3				0.4	0.6
CLO 4					1.0


The orange one must be filled by the supervisory team

Filling Steps:

1. CLO= Jot down the number of CLO for each course (refer to the previous table)
2. PLO= Jot down the number of PLO in each course based on the Semester Lesson Plan (RPS)
3. PLO weight
 - a. Show the number of PLO in each course (for example, the animal feed industry course has 3 PLO).
 - b. Determine the component of assessment aims to achieve any PLO number

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

BASIC FORMAT FOR LECTURE PORTFOLIO

	UNIVERSITY OF BRAWIJAYA FACULTY OF ANIMAL SCIENCE DEPARTMENT OF ANIMAL SCIENCE UNDERGRADUATE STUDY PROGRAM OF ANIMAL SCIENCE		
Course: Animal Feed Processing Science and Technology	Code: PEN60005	RMK :	Semester: 4
Lecturer	<ol style="list-style-type: none">1. Dr.Ir. Eko Widodo, M.Agr.Sc. M.Sc. (Koordinator)2. Prof. Dr.Ir. Siti Chuzaemi, MS. IPU ASEAN Eng3. Prof. Dr.Ir. Hartutik, MP. IPU. ASEAN Eng4. Prof. Dr.Ir. Kusmartono5. Dr. Ir. Osfar Sjojfan, M.Sc. IPU. ASEAN Eng6. Dr.Ir. Irfan H. Djunaidi, MP. IPM. ASEAN Eng7. Dr.Ir. M. Halim Natsir, MP. IPM. ASEAN Eng8. Artharini Irsyammawati, SPt.MP9. Yuli Frita Nuningtyas, SPt.M.Sc.MP10. Poespitasari Hasanah N, SPt. MP.		

<p>Introduction (Tell the explanation needed about this course, experiences that have been done)</p> <p>This course discusses: Characteristics and structure of animal feed materials, agricultural waste and concentrates, physical, chemical and biological animal feed processing technology, as well as the use of industrial by-product and biotechnology, as well as feed additive manufacturing technology</p>	
1	<p>Objectives (Describe the objectives of general and specific course)</p>
	<ol style="list-style-type: none"> 1. Students are able to understand and explain the characteristics of animal feed, agricultural waste and concentrates 2. Students are able to apply animal feed processing technology in accordance with its characteristics physically, chemically, and biologically on animal feed, agricultural waste and concentrate 3. Students are able to evaluate the results of animal feed processing technology physically, chemically, and biologically.
2	<p>Learning Strategies (Describe the strategies used to achieve course objectives - CLO)</p>
	<p>The learning strategies conducted in this course is:</p> <ol style="list-style-type: none"> 1. face to face learning, 2. discussions, 3. structured assignments, 4. quizzes
3	<p>Lecture Management (Describe the management of lectures: lectures, tutorials, practicum, assignments, big assignments, etc)</p>
	<ol style="list-style-type: none"> 1) Lecture: Duration 100 minutes/meeting (14 meetings) 2) Practicum 50 minutes/meeting (14 meetings) 3) Structured Assignments/Quizzes/Group Presentations 4) Attendance: 80 % of the total attendance
4	<p>Lecture Contents (explain their suitability with the applicable curriculum)</p>

	<ol style="list-style-type: none"> 1. Characteristics and Processing Technology of Animal Feed and Agricultural Waste 2. Physical Animal Feed Processing Technology for Animal Feed and Agricultural Waste 3. Animal Feed and Agricultural Waste Processing Technology Chemically (Treatment with acids (SO₂ dan Cl) and alkalis (NaOH, KOH, Ca (OH)₂, NH₃, NH₄(OH), Urea) 4. Animal Feed Processing Technology and Biological Agricultural Waste (Fungi, Enzymes, Bacteria, Mold) 5. Combination of Animal Feed Processing Technology and Agricultural Waste 6. Animal Feed and Agricultural Waste Supplementation Technology (Urea Mollases Block (UMB) and Complete Feed) 7. Mechanical Processing Technology of Concentrate Animal Feed (seed structure, mechanical processing, and nutrient alteration) 8. Physical Processing Technology of Concentrate Animal Feed 9. Processing technology and use of concentrate animal feed from the by-product industry 10. Biological Processing Technology of Concentrate Feed 11. Concentrate Feed of Feed Additive Technology for Non-ruminant Animal Applications 12. Damage to concentrate animal feed during storage
5	<p>Lecture Participants (provide an overview of the participants)</p> <p>The participants of this course are students in semester 4</p>
6	<p>Percentage of Attendance (% attendance of lecturers;% attendance of students)</p> <p>Attendance of lecturers is required to be 100% in the lecture process, while the attendance of students is 80% to be able to take the Final Exam.</p>
7	<p>Evaluation System (explain homework, quizzes, group assignments, practicum, etc.)</p>

	The evaluation consists of quizzes (5%), structured assignments (5%), practicum (30%), Midterm Exam (30%), and Final Exam (30%).
8	Class Observation (explain important and interesting things encountered during the lecture)
9	Learning Outcomes (explain the achievement of the objectives that have been set and include the learning outcomes that can be explained) 1. Students are able to apply Biology, Physiology, Nutrition Science, Breeding Science, and Management for Livestock Raising to understand the concept and implementation in the field of animal science (PLO 6) 2. Students are able to design and carry out experiments, analyze and interpret data to make correct decisions in solving problems in the field of animal science, and meet the ethics and environmentally friendly (PLO 12) 3. Students are able to apply livestock technology oriented towards increasing production, efficiency, quality, and sustainability (PLO 13)
10	Obstacles (give an overview of the main barriers to learning)
11	Distribution of score (provide the distribution of score following the learning outcomes of this course)distribusi nilai berikut ketercapaian capaian pembelajaran matakuliah ini) Midterm Exam 30% Final Exam 30% Practicum 30% Assignments 5% Quizzes 5%

12	Conclusion
13	Recommended Improvement
	Appendices
	1. 2. Etc