


COURSE LEARNING PLAN

	UNIVERSITY OF BRAWIJAYA FACULTY OF ANIMAL SCIENCE DEPARTMENT OF ANIMAL SCIENCE UNDERGRADUATE STUDY PROGRAM OF ANIMAL SCIENCE LESSON PLAN: ANIMAL WASTE MANAGEMENT				
Course	Code		Weight (credits)	Semester	Compilation Date
Farm Waster Management			3 (2-1) credits	6	January 14, 2020
Authorization	Supervising Lecturer			Head of Undergraduate Study Program	Vice Dean 1
	Ir. Nurcholis, Msi. IPM.ASEAN ENG.			Dr. Herly Evanuarini, S.Pt. MP.	Dr. Halim Natsir, S.Pt. MP. IPM.ASEAN ENG.
Learning Outcomes	LO				
(LO)	<div>1. LO 5: Able to study the implications of development or the implementation of science and technology that consider and apply the value of humanities in accordance with the expertise based on scientific principles, procedures, and ethics to produce excellent solutions and ideas</div> <div>2. LO 12: Able to design and carry out experiments, analyze, and interpret data to make correct decisions in solving problems in the field of animal science.</div> <div>3. LO 13: Able to apply livestock technology that is oriented towards improving production, efficiency, quality, and sustainability based on mastery of animal science including breeding, feed, processing of products, marketing management, and organizing a sustainable animal production system, and applying entrepreneurial concepts.</div>				
	CLO				
	<div>Students are able:</div> <div>1. Students understand the basic knowledge about animal waste, including types, benefits, and processing technology.</div> <div>2. Students master basic science in animal waste management, including biochemistry and microbiology</div> <div>3. Students master animal waste processing technology, including biogas and composting</div> <div>4. Students master the basics in the development of industry-based animal waste management (organic fertilizer industry, Liquid Biogas industry)</div> <div>5. Students understand business opportunities in the field of animal waste management</div> <div>6. Students master integrated animal waste management technology on an industrial scale</div>				

Brief Course Description	This course discusses the science and knowledge about animal waste, waste management technology, basics in the development of industry-based animal waste management, business opportunities in the field of animal waste management, and integrated animal waste management technology on an industrial scale.
Learning Content	<ol style="list-style-type: none"> 1. Introduction: Basic knowledge (Types, Benefits, and Processing technology) 2. Basic science: Fermentation (biochemistry), microbiology in waste management processes 3. Animal waste management technology: Biogas and compost 4. Industry-based animal waste management: Organic fertilizer industry, Liquid Biogas industry 5. Business opportunities from animal waste management products

		6. Industrial system: Integrated System of Animal Waste Management				
References		1. Kaharudin dan Sukmawati, 2010. Petunjuk Praktis; Manajemen Umum Limbah Ternak untuk Kompos dan Biogas. Balai Penelitian dan Pengembangan Pertanian. Balai Besar Pengkajian Pengembangan Teknologi Pertanian. Balai Pengkajian Teknologi Pertanian NTB. Kementerian Pertanian 2. Setiasih, 2011. Membuat Dekomposer Dari Bahan Lokal. Balai Pengkajian Teknologi Pertanian Jawa Timur. 3. Athena Lee Bradley. 2008. Manure Management for Small and Hobby Farms. Northeast Recycling Council, Inc.				
Learning Media		Software		Hardware		
		Sketch-up, Corel Draw		Miniature of Biogas Digester, Compost Bin		
Teaching Team		1. Nur Cholis 2. Heni Setyo Prayogi 3. Ita Wahyu N 4. Moch. Junus 5. Dyah Lestari				
Pre-requisite Courses		Biology and Biochemistry				
Week (s)	Sub-Course Learning Outcomes (SCLO)	Indicators	Learning material/topics	Learning Methods	Criteria & Form of Assessment	Weighted scores (%)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1	CLO 1	Able to explain the types, benefits, and processing technology	Basic Knowledge of Animal Waste – Types – Benefits – Processing Technology	Lecture, Discussion	Active participation	
2	CLO 2	- Able to explain about animal waster biochemistry - Able to explain about animal	Basic Science of Animal Waste – Biochemistry – Fermentation	Lecture, Discussion		

		waste fermentation				
3	CLO 2	Able to explain the microbiology of animal waste	Basic Science of Animal Waste - Microbiology of Animal Waste Management	Lecture, Discussion	Written test	5%

4	CLO 3	Understand and able to explain the principle of the formation of methane gas (CH ₄)	Animal Waste Management Technology (Biogas) – Principle of the Formation of Methane Gas (CH ₄)	Lecture, discussions, and practicum		
5	CLO 3	Able to design and construct biogas digesters	Animal Waste Management Technology (Biogas) – Types and Forms of Digester – Digester Design and Construction	Lecture, discussions, and practicum		
6	CLO 3	Understand and able to explain the principle of composting	Animal Waste Management Technology (Composting) – Composting Principle	Lecture, discussions, and practicum		
7	CLO 3	Able to practice composting	Animal Waste Management Technology (Composting) – Compost Utilization (Plant Fertilizer, Media containing worm, Fungal Growth Media)	Lecture, discussions, and practicum	Practicum	20%
8	MIDTERM EXAM					30%
9	CLO 4	Able to explain organic fertilizer waste management technology on an industrial scale	Industry-Based Animal Waste Management – Organic Fertilizer Industry	Lecture, Discussion		

10	CLO 4	Able to explain biogas liquid waste management technology on an industrial scale	Industry-Based Animal Livestock Waste Management – Liquid Biogas Industry	Lecture, Discussion		
11	CLO 5	Able to analyze the biogas liquid waste management industry	Business Opportunities from Animal Waste Management Products – A Case Study of Liquid Biogas Industry	Lecture, Discussion	Group Presentation	
12	CLO 5	Able to analyze the organic fertilizer and vermicompost management industry	Business Opportunities from Animal Waste Management Products – A Case Study of Organic Fertilizer Industry – A Case Study of the Vermicompost Industry	Lecture, Discussion	Group Presentation	
13	CLO 5	Able to analyze starter/decompose industry and mushroom cultivation	Business Opportunities from Animal Waste Management Products – Starter/Decomposer Industry – A Case Study of Mushroom Industry	Lecture, Discussion	Group Presentation	
14	CLO 6	Able to analyze animal waste management technology integrated with non-ruminant livestock farming	Integrated System of Animal Waste Management – A Case Study of non-ruminant Farming Business	Lecture, Discussion	Group Presentation	

15	CLO 6	Able to analyze animal waste management technology integrated with ruminant livestock farming	Integrated System of Animal Waste Management – A Case Study of Ruminant Farming Business	Lecture, Discussion	Group Presentation	5%
16	FINAL EXAM					30%
	TOTAL					100%