COURSE LEARNING PLAN

	UNIVERSITY OF BRAWIJAYA FACULTY OF ANIMAL SCIENCE DEPARTMENT OF ANIMAL SCIENCE UNDERGRADUATE STUDY PROGRAM OF ANIMAL SCIENCE LESSON PLAN: MICROBIOLOGY

Course	Code	Weight (credits)	Semester	Compilation Date
Microbiology	PET60001	2-1	Even semester 2019/2020	January 7, 2020

Authorization	Course Coordinator	Head of Undergraduate Study Program of Animal Science	Vice Dean 1
	Dr. Abdul Manab, S.Pt, MP	Dr. Herly Evanuarini, S.Pt, MP	Dr. Ir. M. Halim Natsir, S.Pt., MP., IPM., ASEAN Eng.

Learning Outcomes (LO)	PLO
	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 7: Able to demonstrate independent, quality, and measurable performance (both quality and quantity) effectively, efficiently, and sustainably LO 8: Able to cooperate effectively and carry out a self-evaluation process towards the workgroup under their responsibility. 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
	CLO
	1. Able to explain the development of Microbiology 2. Able to understand the types of microbes and the role of microbial reproduction 3. Able to apply basic techniques of Microbiology 4. Able to apply Microbiology in the animal industry with the added value of feedstuffs and animal products

Brief Course Description	Microbiology provides (1) Knowledge of the various types, roles, and functions of microbes in life with case examples in animals, animal feed, and animal products that can affect the quality of life of the relevant animals and consumer society; (2) Skills in identifying, breeding and counting the number of microbes in a medium; and (3) Introduction of equipment and materials needed for microbiological observation and SOP in the field of microbiological analysis, (4) Application of microbiology in the field of animal science
Topics	1. Development of Microbiology 2. Types of Microbes (structure and function of microbial cells) 3. Microbial Reproduction 4. Basic Techniques of Microbiology 5. Applications of Microbiology in the field of Animal Science
References	**Textbooks**: Radiati, L E., Andriani RD., Apriliyani MW., and Rahayu PP. 2020. Mikrobiologi Dasar Hasil Ternak. UB Press, Malang. Soetanto, H. 2019. Pengantar Ilmu Nutrisi Ruminansia. UB Press, Malang. Sjofjan, O., M.H. Natsir., Irfan HD., 2019. Ilmu Nutrisi Ternak Non Ruminansia. UB Press, Malang. **Textbooks:** Buckle, K.A, R.A Edward, G.H Fleet and M. Wooton. 1987. Ilmu Pangan. Terjemahan Hari Purnomo. Jakarta: Universitas Indonesia Press. Capuccino, J. G.and Natalie S. 2000. Microbiology A Laboratory Manual. Benjamin/Cummings Publishing Company Inc., Menis Park, California. Dehority, B.A, 2003. Rumen microbiology. Nottingham University Press; 1 edition. Fuller, Sheryl L. 2007. General Microbiology Laboratory –BIO 308L-. www.mhhe.com Hobson,P.N., 19 The Microflora of the Rumen. http://www.microbiologytext.com/index.php?module=Book&func=displayarticlesinchapter&chap_id=32 John G. Holt. 1994. Bergey's Manual of Determinative Bacteriology. Lippincott Williams & Wilkins. Michael T. Madigan, John M. Martinko, David A. Stahl, and David P. Clark. 2010. Brock Biology of Microorganism (13th Edition). Benjamin Cummings. Ogimoto, and Imai, ,1981. An Atlas of Rumen Microbiology. Powar and Daginawala. 2010. General Microbiology. Himalaya Publishing House. Radiati, LE. 2009. Mekanisme Antimikroba. Lab. Faal FK. UB Reynolds, Jackie. 2005. Lab Procedures Manual Biol. 2421 Lab Manual. ww.rlc.dcccd.edu. **Journals:**

	Food Control. https://www.sciencedirect.com/journal/food-control FEMS Microbiology Reviews. https://www.sciencedirect.com/journal/fems-microbiology-reviews/issues Applied and Environmental Microbiology. https://aem.asm.org/	
Learning Media	Software	Hardware
	Video	LCD Laptop/Computer
Teaching Team	1. Prof. Ir. Hendrawan Soetanto M.Rur.Sc., Ph.D. 2. Prof. Dr.Ir. Lilik Eka Radiati MS., IPU 3. Prof. Dr. Ir. Djalal Rosyidi, MS 4. Dr.Ir. Osfar Sofjan M.Sc. IPU, ASEAN Eng 5. Dr. Ir. Marjuki, M.Sc 6. Dr. drh. Rositawati, MS 7. Dr. Ir. Siti Nurul Kamaliyah, MP 8. Dr. Agus Susilo, S.Pt., MP 9. Dr. Khotibul Umam Al-Awwaly, S.Pt., M.Si 10. Dr. Herly Evanuarini, S.Pt., MP 11. Dr. Abdul Manab, S.Pt, MP 12. Dr. Dedes Amertaningtyas, S.Pt, MP 13. Dr. Premy Puspitawati Rahayu, S.Pt, MP 14. Ria Dewi Andriani, S.Pt, M.Sc 15. Mulia Winirsya Apriliyani, S.Pt, MP	
Prerequisite course	Biology	

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 explain coherently and properly the development of microbiology,	Analyze the development of microbiology, important figures, and	Learning Guidelines for Microbiology course 1. Competence to be achieved	Lectures and demonstrations on the research of development of microbiology	- Familiar with the group members and other group members - ability to write narratives coherently	5

	important figures, and its application in the field of animal science	its application in the field of animal science	2. Scope of teaching material 3. Lecture rules, assignments, exams, and assessments 4. Forming a study group consisting of 5-6 people **Module A:** Development of Microbiology: The discovery of microbes 1. Important figures in Microbiology 2. Technological developments in the field of microbiology 3. Applications of Microbiology in the field of animal science		and properly about the concept map of the breadth and depth of information sources as outlined in the form of the role of animal microbiology in contributing to benefit the society. - Make Summary about group members (Log Book)	
2	Able to recognize and differentiate genus of various microbes, especially from groups of bacteria, protozoa, molds, yeasts along with their functions and roles in the field of animal science	Documenting various types of microbes, especially in terms of morphology and physiology.	**Module B** Types of Microbes (Bacteria)	- Lecture - Discussion - Group assignment: collect various type of microbes visually - All assignment is carried out in a logbook (notes)	- Ability to summarize and display the material as outlined in the form of images of the types of microbes - Able to list the differences and similarities of the types of microbes through identification	5

					according to certain standards correctly - The ability of teamwork (include a teamwork logbook in the report	
3	Able to recognize and differentiate genus of various microbes, especially from groups of bacteria, protozoa, molds, yeasts along with their functions and roles in the field of animal science	Documenting fungi/molds/yeasts and their functions and roles in examples of animal science	**Module B** Types of Microbes (Fungi, Molds, Yeasts)	- Lecturers carry out a second assessment by looking at the learning progress of the students through the logbook (Notes). - Lecture - Discussion - Group assignment: collect various type of microbes visually, logbook	- Ability to summarize and display the material as outlined in the form of images of the types of microbes - Able to list the differences and similarities of the types of microbes through identification according to certain standards correctly - The ability of teamwork (include a teamwork logbook in the report	5
4	Able to recognize and differentiate the genus of various types of microbes, especially from groups of protozoa, viruses/ bacteriophages, prions along with their functions and roles in animal science.	Documenting various types of microbes, especially from groups of protozoa, viruses/ bacteriophages, prions along with their functions and roles in animal science.	**Module B** Types of Microbes (Viruses/ Bacteriophages, Prions)	- Lecture - Discussion - Group assignment: collect various type of microbes visually	- Ability to summarize and display the material as outlined in the form of images of the types of microbes - Able to list the differences and similarities of the types of microbes through identification according to certain standards correctly	5

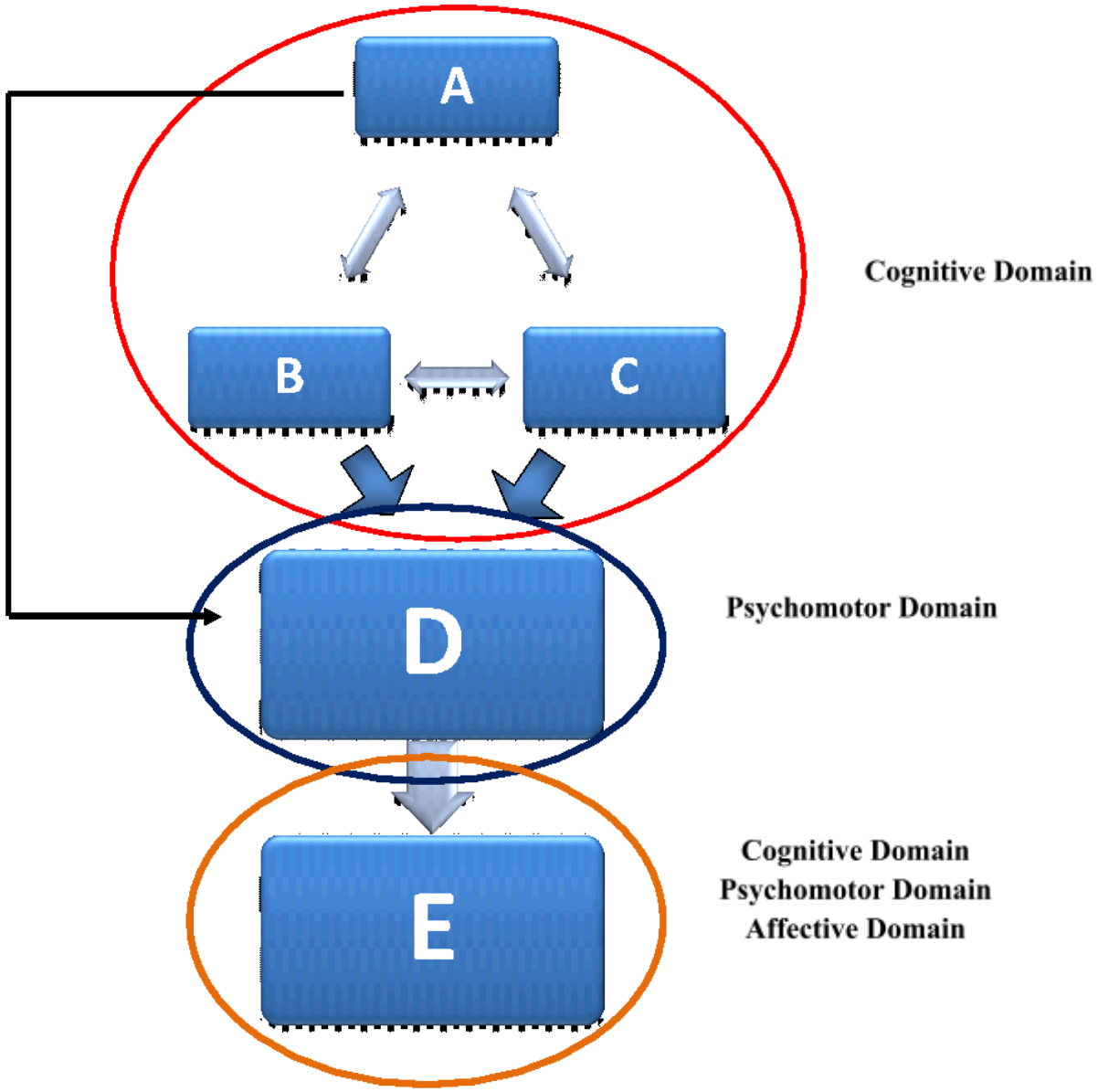
					- The ability of teamwork (include a teamwork logbook in the report	
5	Able to explain properly the process of microbial reproduction and intrinsic and extrinsic factors and environmental interactions	Documenting the process of certain microbial reproduction and their influencing factors	**Module C** Microbial Reproduction (Factors influencing microbial growth)	Group assignment: Making simple A4 paper/ poster by groups 1,2,3	- Able to explain by making their diagrams about the factors that influence the microbial growth - Changes in attitude in discussion and cooperation/teamwork	7.5
6	Able to explain properly the process of microbial reproduction and intrinsic and extrinsic factors and environmental interactions	Documenting the process of certain microbial reproduction and their influencing factors	**Module C** Microbial Reproduction (Factors influencing microbial growth)	Group assignment: Making simple A4 paper/ poster by groups 4,5,6	- Able to explain by making their diagrams about the factors that influence the microbial growth - Changes in attitude in discussion and cooperation/teamwork	7.5
7	Able to explain properly the process of certain microbial reproduction due to environmental factors and interactions between microbes	Analyze properly the process of certain microbial reproduction due to environmental factors and interactions between microbes	**Module C** Microbial Reproduction (Metabolism)	Group assignment: Making simple A4 paper/ poster by groups 7,8	- Able to explain the process of nutrient metabolism in bacteria properly - Changes in attitude in discussion and cooperation	7.5
	MIDTERM EXAM					
8	Able to explain properly the process of certain microbial reproduction due to environmental factors	Describe properly the process of certain microbial reproduction due to environmental factors and	**Module C** Microbial Reproduction (Reproduction interaction between microbes)	- Lecture - Discussion - Quizzes: The influencing factors of microbial reproduction	- Able to explain using their own words about the types of microbial reproduction	7.5

	and interactions between microbes	interactions between microbes		- Format google form, multiple-choice	- Able to answer the questions properly in the google form	
9	Able to explain and carry out a basic level of work procedures in the laboratory of microbiology Able to show changes in discipline, obedience, and cooperation among fellow students	Make diagrams about the basic level of work procedures in the laboratory of microbiology Proper understanding of changes in discipline, obedience, and cooperation among fellow students	**Module D** Basic Techniques of Microbiology (The main equipment needed in the field of Microbiology)	Training / mentoring Practicum Group assignments Quizzes-cross check for practicum assignments with google form format (carry out as a practicum entrance ticket)	Ability to explain and carry out the work procedure in the laboratory of Microbiology	10
10	Able to explain and carry out a basic level of work procedures in the laboratory of microbiology	Apply the basic level of work procedures in the laboratory of microbiology	**Module D** Basic Techniques of Microbiology (Sampling techniques)	Training / mentoring Practicum Group assignments	- Ability to carry out the sampling process - Changes in disciplinary attitude (Student submit the assignment and the assignment is returned after corrected on time, shows cooperation between peers	10
11	Able to show changes in discipline, obedience, and cooperation among fellow students	Apply the disciplinary attitudes, obedience, and cooperation among fellow students	**Module D** Basic Techniques of Microbiology (Isolation, Staining, Identification of Microbes	Training / mentoring Practicum Group assignments	- Ability to carry out isolation, staining, and identification of certain microbes using appropriate equipment and references - Cleanliness and cooperation among peers	10

12	Able to provide examples of applications for the use of microbes in the field of animal science along with a critical analysis of problems and solutions	Applying examples of applications for the use of microbes in the field of animal science along with critical analysis of problems and solutions	**Module E** Applications of Microbiology in the animal industry (Microbes in the animal digestive systems)	- Training/mentoring - Small project browsing information for chapter 13, 14, and 15 from the journal - Making group reports (journal resume)	Able to make a small project about the application of microbes in the field of animal science	10
13	Able to provide examples of applications for the use of microbes in the field of animal science along with a critical analysis of problems and solutions	Applying examples of applications for the use of microbes in the field of animal science along with critical analysis of problems and solutions	**Module E** Applications of Microbiology in the animal industry (Utilization of microbes for the preservation of feed and microbes as feed additives)	Continuation: - Presentation of the results (5 minutes)	Able to make a small project about the application of microbes in the field of animal science	10
14	Able to provide examples of applications for the use of microbes in the field of animal science along with a critical analysis of problems and solutions	Applying examples of applications for the use of microbes in the field of animal science along with critical analysis of problems and solutions	**Module E** Applications of Microbiology in the animal industry (Processed animal products using microbes)	Continuation: - Presentation of the results (5 minutes)	Able to make a small project about the application of microbes in the field of animal science	10
	FINAL EXAM					

GUIDELINES FOR LECTURERS AND STUDENTS

1. RELATIONS BETWEEN MODULES AND LEARNING OUTCOMES



2. **Activities in the classroom**

Activities in the classroom (discussion of course materials I - V, discussion, midterm exams, and presentation of group assignments), are performed at scheduled times. Activities outside the classroom (browsing the Internet, practicing course materials I - V, working on group assignments and exhibitions) are carried out with more free time but are still within the weekly schedule that has been determined. For group activities (making work plans for group assignments, working on group assignments, and revising reports), the scheduling is arranged according to the agreement of members in the group to create **group independence** and **teamwork.**

3. **Clippings and Logbook Exhibitions**

Clippings and logbook exhibitions are held to **increase motivation to compete** with other groups, the content of the logbook is a track record of what has been learned (it is not a list but material that has been obtained from each learning source from various media and experiences gained from the surrounding environment) which can be an element to **improve creativity**. The time of the exhibition is determined at the end of the mid-semester and according to the agreement.

4. **Handouts and learning modules**

All material is given to lecture participants before the lecture meeting. Students are required to study each material before the material discussed in class so that the discussion in class is more focused on **confirmation** and **discussion** of what they have learned themselves outside the classroom. The material discussed is focused on important parts of the material and details that students are interested in (it is not limited to the content of the handouts and modules). This is aimed to **increase student motivation and interest**. Students are asked to be **active** to find their additional material for each material through the Internet. Internet facilities in the Computer Lab and a list of suggested links **are provided** for the students to make it easier for them to find existing materials.

5. Demo

A demo was conducted on material related to animal microbiology and its processed products at the beginning of the lecture **to attract students' interest and motivation** and to provide an overview of the practices that would be conducted throughout the semester. The demo will be held in the classroom using computer facilities and LCD

projectors as well as props that will be made. This demo is an image processing application in the field of microbiology.

6. **Practice in the Laboratorium of Microbiology**

Practicum is prepared to help students to be **more active** in understanding the theoretical material being taught. Module D is an instrument for mastering knowledge about microbiology and developing the **psychomotor domain**. Changes in knowledge and skills as described in Module D will provide a change in attitude which will be described in Module E. Practice for a topic is carried out synergistically with the discussion of the material in class, so that students are expected to **have a practical picture** of the theory that will be given in class. The practice modules are also given before the practicum is conducted. The practice guidelines focus more on work instructions in the laboratory and data analysis activities. Students are provided with detailed modules on what to do during practice. The teaching lecturer is obliged to provide direction to the practicum group according to the coaching plot, namely the responsibility of the teaching lecturer in assisting the assistants and students. It is planned that an assistant will assist in the course of the practicum. Therefore, students are expected to **actively** learn and carry out the practice materials. The practice module is in the form of an example of working in a basic microbiology laboratory that corresponds to the topic to be discussed in class in the following week (the topic of the assignment always precedes the classroom discussion) and is equipped with assignments that will have to be submitted during the next practicum. These assignments are in the form of sampling, breeding process, staining, and identification of certain microbes for each group.

7. Monitoring and Feedback

Monitoring and feedback documents include and are manifested in forms consisting of:

a. Plan document/weekly activity form
b. Plan document /feedback form from students
c. Plan document /change form

The form is filled out and evaluated at each meeting to get an overview of the course of the learning process. General problems are immediately fixed and immediately applied to the next meeting, while those that are fundamental will be recorded for improvement in the following semester.

8. Evaluation Planning (Gap and Roots of Problems)

The evaluation includes:

1. Learning outcomes

Evaluation of the student's ability to understand the concept is carried out in writing (two times), namely the scheduled midterm exam and final exam. These results describe the individual student's ability to achieve LEARNING OUTCOMES related to the ability to understand the course material given. From here, the percentage of students who managed to achieve this is analyzed.

Evaluation of students' practical abilities is carried out whenever discussing materials are related to these practices.

2. Learning process

The learning process is evaluated by analyzing the monitoring form and feedback to see the effectiveness of each learning component. Furthermore, there will also be unannounced inspections at the Laboratoium to see the practicum implementation.

3. Obstacles and shortcomings

The barrier that may arise here is the possibility of large class sizes for practicum implementation, especially in practicum implementation. The practice schedule will be carried out according to class size after course registration according to the student's study plans. The strict scheduling also has the potential to cause problems when the students are late taking this course, due to late filling in their study plan (so far there have been many). Therefore, they will be asked to immediately carry out the follow-up practice. Students who are unable to attend practicum because they are sick or have family matters are required to take part in a follow-up practicum with independent practicum fees.

4. Possible improvements

The material for examples of the application and advanced materials can change according to student interests. The differences that exist between several textbooks, for example in formulation and definition will be used as discussion material to improve the handout material. Students with special needs as in 8.3 are required to take a follow-up exam.

9. Rubrics for assessment

1. Design of the exam question is in accordance with the weight score of the lesson plan
2. Rubrics for assessment of the oral presentation

Dimensions	Very good	Good	Satisfying	Sufficient	Insufficient
Organizations	Organized presentation by presenting facts which are supported by examples that	The presentation is well organized and provides compelling	The presentation has focus and provides some evidence to	The presentation has enough focus, but it has insufficient	There is no clear organization. Facts are not used to support statements.

	have been analyzed according to the concept (9-10)	facts to support the conclusions. (6-8)	support the conclusions (4-5)	evidence that can be used to draw conclusions (3-2)	(0-1)
Contents	Content can inspire listeners to develop thoughts or conceptualize (14-15)	The content is accurate and complete. it adds new insights to the listeners about the topic. (10-13)	Content is generally accurate, but incomplete. Listeners can learn some of the facts between the lines, but they do not add new insights into the topic. (6-9)	The content is less accurate because there is no factual data, it does not increase the listener's understanding (3-5)	The content is inaccurate or too general. The listener doesn't learn anything or is misleading at times. (0-3)
Delivery methods	Speak with enthusiasm, transmit passion and enthusiasm to the listeners (9-10)	The speaker is calm and uses the correct intonation, speaks without relying on notes, and interacts intensively with the listener. The speaker always makes eye contact with the listener. (7-8)	The speaker is generally calm, but speaks in a flat tone and relying on the notes quite often. Sometimes eye contact with listeners is ignored. (4-6)	Relying on the notes, no ideas are developed outside of notes, speaks in monotonous sound (2-3)	The speaker is anxious and uncomfortable , and reads the notes rather than talking. Listeners are often ignored. There is no eye contact as the speaker is more focused on the board or screen. (0-1)
Weighted scores					

10. **Assessment:**

a. Individual assessment in accordance with the weighted rating that has been determined includes::
   i. *Midterm Exam* : 35%
   ii. Final Exam & Portfolio : 35%
   iii. Practicum : 30%

b. The standard conversion of score that has been planned:
   A Total score >= 80

B+ 75 <= Total score < 80
B 70 <= Total score < 75
C+ 60 <= Total score < 70
C 50 <= Total score < 60
D 25 <= Total score < 50
E Total score < 25

&b. Feedback form

No	Questions	Answer				
No	Questions	1	2	3	4	5
1	The clarity level of Semester Lesson Plan (RPS)					
2	The suitability of the instructional material provided with the Semester Lesson Plan (RPS)					
3	Notification of reference books on lecture materials					
4	How to deliver course material					
5	Lecturers master the material presented					
6	Lecturers answer student questions					
7	How to deliver course material by the lecturer					

8	The flow of the delivery of course material and the level of ease of understanding					
9	The use of media in lectures					
10	Lecturer providing assignments to students					
11	Lecturer providing feedback in the form of explanation on students' assignment					
12	The lecturer returns the assignments to students					
13	The objectivity of lecturer assessment					
14	Clarity of assessment instruments					
	Total					

ASSESSMENT RUBRIC

	UNIVERSITY OF BRAWIJAYA FACULTY OF ANIMAL SCIENCE DEPARTMENT OF ANIMAL SCIENCE UNDERGRADUATE STUDY PROGRAM OF ANIMAL SCIENCE		
Course	Microbiology		
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 explain the development of Microbiology			
Very good (4)	Able to explain and master **comprehensively** and **sequentially** the development of microbiology Explain the classification (from kingdom-species)	80-100	1
Good (3)	Able to explain **properly** about the development of microbiology	70-79	0.75
Moderate (2)	Able to explain the development of microbiology **quite well**	60-69	0.5

Poor (1)	**Less capable** and **less consistent** in explaining the development of microbiology	<60	0.25
Score Level	CLO and PLO	Conversion	PLO score
PLO 7: Able to demonstrate independent, quality, and measurable performance (both quality and quantity) effectively, efficiently, and sustainably CLO 2: Able to understand the types of microbes and the role of microbial reproduction			
Very good (4)	Able to explain and master **comprehensively** and **sequentially** about the types of microbes and the role of microbial reproduction	80-100	1
Good (3)	Able to explain **properly** the types of microbes and the role of microbial reproduction	70-79	0.75
Moderate (2)	Able to explain the types of microbes and the role of microbial reproduction **quite well**	60-69	0.5
Poor (1)	**Less capable** and **less consistent** in explaining the types of microbes and the role of microbial reproduction	<60	0.25
Score Level	CLO and PLO	Conversion	PLO score
PLO 8: Able to cooperate effectively and carry out a self-evaluation process towards the workgroup under their responsibility CLO 3: Able to apply the basic techniques of Microbiology			
Very good (4)	Able to explain and master **comprehensively** and **sequentially** about the basic techniques of microbiology	80-100	1
Good (3)	Able to explain **properly** about the basic techniques of microbiology	70-79	0.75
Moderate (2)	Able to explain **quite well** about the basic techniques of microbiology	60-69	0.5
Poor (1)	**Less capable** and **less consistent** in explaining the basic techniques of microbiology	<60	0.25
Score Level	CLO and PLO	Conversion	PLO score
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 CLO 4: Able to apply Microbiology in the animal industry with the added value of feedstuffs and animal products			
Very good (4)	Able to apply **comprehensively** and **sequentially** about microbiology in the animal industry, the added value of feedstuffs, and animal products	80-100	1
Good (3)	Able to apply **properly** the animal industry, the added value of feedstuffs, and animal products	70-79	0.75

Moderate (2)	Able to apply **quite well** the animal industry, the added value of feedstuffs, and animal products	60-69	0.5
Poor (1)	**Less capable** and **less consistent** in applying the animal industry, the added value of feedstuffs, and animal products	<60	0.25
Score Level	CLO and PLO	Conversion	PLO score

How to Calculate the PLO Score : $\frac{Score\ Level}{\sum Score\ Level} \times \frac{\sum CLO}{\sum PLO}$

Calculation of CLO Score

Components assessed	Component Weights	CLO Weight against Score			
		CLO 1	CLO 2	CLO 3	CLO 4
Midterm Exam	25	50	50		
Final Exam	25			50	50
Practicum	25	25	25	50	25
Assignments	15	30	30	40	
Quizzes	5			50	50
Presentation	5		35	35	30
CLO WEIGHT					

Calculation of PLO Score

CLO	CLO Score	CLO Weight	PLO			
			PLO 6	PLO 7	PLO 8	PLO 12
CLO 1			50	50		

CLO 2			30	30	40	
CLO 3			25	25	25	25
CLO 4			25	25	25	25

Lecture Portfolio

UNIVERSITY OF BRAWIJAYA **FACULTY OF ANIMAL SCIENCE** **STUDY PROGRAM OF ANIMAL SCIENCE**			
Course: Microbiology	Code: PET60001	RMK :	Semester: 1/3
Lecturer	1. Prof. Ir. Hendrawan Soetanto M.Rur.Sc., Ph.D. 2. Prof. Dr.Ir. Lilik Eka Radiati MS., IPU 3. Prof. Dr. Ir. Djalal Rosyidi, MS 4. Dr.Ir. Osfar Sofjan M.Sc. IPU, ASEAN Eng 5. Dr. Ir. Marjuki, M.Sc 6. Dr. drh. Rositawati, MS 7. Dr. Ir. Siti Nurul Kamaliyah, MP 8. Dr. Agus Susilo, S.Pt., MP 9. Dr. Khotibul Umam Al-Awwaly, S.Pt., M.Si 10. Dr. Herly Evanuarini, S.Pt., MP 11. Dr. Abdul Manab, S.Pt, MP 12. Dr. Dedes Amertaningtyas, S.Pt, MP 13. Dr. Premy Puspitawati Rahayu, S.Pt, MP 14. Ria Dewi Andriani, S.Pt, M.Sc 15. Mulia Winirsya Apriliyani, S.Pt, MP		
Introduction (Tell the explanation needed about this course, experiences that have been done) This course discusses: Microbiology provides (1) Knowledge of the various types, roles, and functions of microbes in life with case examples in animals, animal feed, and animal products that can affect the quality of life of the relevant animals and consumer society; (2) Skills in identifying, breeding and counting the number of microbes in a medium; and (3) Introduction of equipment and materials needed for microbiological observation and SOP in the field of microbiological analysis, (4) Application of microbiology in the field of animal science			
1	**Objectives** (Describe the objectives of general and specific course)		
	After completing this course, the students are: 1. Able to explain the development of Microbiology 2. Able to understand the types of microbes and the role of microbial reproduction 3. Able to apply basic techniques of Microbiology 4. Able to apply Microbiology in the animal industry with the added value of feedstuffs and animal products		
2	**Learning Strategies** (Describe the strategies used to achieve course objectives - CLO)		
	Learning strategies carry out in this course are lecture, demonstration, group assignment by carrying out an assignment in the logbook (notes), quizzes, and presentation		
3	**Lecture Management** (Describe the management of lectures: lectures, tutorials, practicum, assignments, big assignments, etc)		
	1) Lecture: Duration 100 minutes/meeting (14 meetings) 2) Practicum 150 minutes/meeting (14 meetings)		

	3) Structured Assignments/Quizzes/Group Presentations 4) Attendance: 80 % from total attendance *According to the table of calculation of CLO score*
4	**Lecture Contents** (explain their suitability with the applicable curriculum)
	1. Development of Microbiology 2. Types of Microbes (structure and function of microbial cells) 3. Microbial Reproduction 4. Basic Techniques of Microbiology 5. Applications of Microbiology in the field of Animal Science
5	**Lecture Participants** (describe the participants)
	The participants of this course are students in semester 3 who have passed the Biology course
6	**Percentage of Attendance** (% attendance of lecturers;% attendance of students)
	% attendance of lecturer: 100% % attendance of student:80%
7	**Evaluation System** (explain homework, quizzes, group assignments, practicum, etc.)
	Minimum attendance 80% *Final score from all components of evaluation of teaching and learning process (PBM)* *Component of final score:* *Midterm Exam 25%* *Final Exam 25%* *Practicum 25%* *Structured assignments 15%* *Quizzes 5%* *Presentations 5%* (based on the table of calculation of CLO score and calculation of PLO score)
8	**Class Observation** (explain important and interesting things encountered during the lecture)
	1. Attendance of students 100% 2. Students take quizzes for… times 3. Students answer questions from lecturers correctly as a form of lecture reflection at each meeting (proof of the student's name and student identification number in the attachment) 4. Conduct a pretest to students via google form (regarding interest in the course, so that there is conditioning
9	**Learning Outcomes** (explain the achievement of the objectives that have been set and include the learning outcomes that can be explained)
	Learning outcomes that are expected is: 1. 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 2. PLO 7: Able to demonstrate independent, quality, and measurable performance (both quality and quantity) effectively, efficiently, and sustainably 3. PLO 8: Able to cooperate effectively and carry out a self-evaluation process towards the workgroup under their responsibility. 4. 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

10	**Obstacles** (Describe the main barriers to learning)
	1. Students have internet connection problem during the online class 2. Inadequate practicum equipment
11	**Distribution of score** (provide the distribution of score following the learning outcomes of this course)
12	**Conclusion**
	Minimum attendance 80% *Final score from all components of evaluation of teaching and learning process (PBM)* *Component of final score:* *Midterm Exam 25%* *Final Exam 25%* *Practicum 25%* *Structured assignments 15%* *Quizzes 5%* *Presentations 5%* The success to make the students achieve CLO 1
13	**Recommended improvement**
	The success to make the students achieve CLO 1 what percentage Highest learning outcomes The lowest learning outcomes, it is difficult to achieve the instructor's strategy to achieve it
	Appendices:
	1. Results of assignment 2. Quizzes 3. Results of the learning process etc