COURSE LEARNING PLAN

	UNIVERSITY OF BRAWIJAYA FACULTY OF ANIMAL SCIENCE DEPARTMENT OF ANIMAL SCIENCE UNDERGRADUATE STUDY PROGRAM OF ANIMAL SCIENCE LESSON PLAN: Instrumentation and Analysis Techniques Laboratory

Course	Code	Weight (credits)	Semester	Compilation Date
Instrumentation and Analysis Techniques Laboratory	PEF60002	2-1 credits	2 (two)	July 28, 2020

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

Learning Outcomes (LO)	
	LO
	1. LO 3: Demonstrate attitudes of friendly and caring about animal welfare and permissible (halal) consumption. 2. 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 3. LO 7: Able to demonstrate independent, quality, and measurable performance (both quality and quantity) effectively, efficiently, and sustainably
	CLO
	1. Able to identify, explain the functions and work procedures of laboratory equipment. 2. Able to understand and explain laboratory analysis techniques in the field of animal science. 3. Able to explain and implement laboratory safety and security.

<table>
<tr><td>Brief Course Description</td><td colspan="2">This discourse discusses:
1. Work regulations in the laboratory
2. Work safety in the laboratory (from chemicals and work procedures)
3. Implementing good and safe work standards (SOP, Standard Operational Procedure) in the laboratory in practicum activities and Good Laboratory Practice (GLP).</td></tr>
<tr><td>Topics</td><td colspan="2">1. Introduction
2. Work safety and security in the laboratory
3. Introduction of equipment (functions and work procedures) in the laboratory
4. Introduction to chemicals, chemical codes, and how to handle them
5. The sampling procedure in the analysis
6. Proximate analysis procedure and calorimeter bomb
7. Digestibility Analysis Procedure
8. Analytical Equipment (Microscope and Haemocytometer)
9. Analysis Equipment (Spectrophotometer)
10. Analytical Equipment (Chromatography)
11. Electrophoresis Procedure
12. Amino acid analysis
13. Reliability
14. Analysis procedure for analysis of meat, milk, and eggs</td></tr>
<tr><td>References</td><td colspan="2">1. ……..
2. .....</td></tr>
<tr><td rowspan="2">Learning Media</td><td>Software</td><td>Hardware</td></tr>
<tr><td>- Video
- Powerpoint
- Articles
- Book References</td><td>- Laptop
- LCD</td></tr>
<tr><td>Teaching Team</td><td colspan="2">1. Hartutik, Prof. Dr. Ir., MP. IPU. ASEAN Eng
2. Siti Chuzaemi, Prof. Dr. Ir., MS. IPU. ASEAN Eng
3. Marjuki, Dr. Ir., M.Sc
4. Puguh Surjowardojo, Dr. Ir. MS
5. Tri Eko Susilorini, Dr. Ir. MS. IPM. ASEAN Eng</td></tr>
</table>

	6. Muharlien, Dr. Ir. MP 7. Manik Eirry Sawitri, Dr. Ir.MS. 8. Khotibul Umam A., Dr. S.Pt., Msi 9. Siti Nurul Kamaliyah, Dr.Ir.MP. 10. Abdul Manab, Dr. S.Pt.,MP 11. Dedes Amertaningtyas, Dr. S.Pt., MP. 12. Aswah Ridhowi, S.Pt., M.Sc 13. Aulia Puspita A.Y., S.Pt.MP., M.Sc 14. Firmansyah Tri Saputra,S.Pt.,M.Sc 15. Wike Andre Septian, S.Pt.,M.Si 16. Poespitasari Hazanah Ndaru, S.Pt.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 general laboratory work procedures	Able to explain general laboratory work procedures	Introduction (work procedures, work safety and security in the laboratory)	Lectures and discussions	Midterm exam	5
2	Able to understand the introduction of equipment (functions and work procedures) in the laboratory	Able to explain measuring instruments in the laboratory (weight, volume, length, dimensions of animals, temperature,	Introduction to Measuring Instruments in the Laboratory (Weight, Volume, Length, dimensions of animals, temperature, pH	Lectures and discussions	Midterm exam	5

		pH, and unit conversion)	and Unit Conversions)			
3	Able to understand chemicals, chemical code, handling, and manufacturing methods	Able to explain chemicals, chemical code, handling, and manufacturing methods	Introduction to chemicals, chemical codes, handling, and making solutions	Lectures and discussions	Midterm exam	5
4	Able to understand the sampling procedure in analysis	Able to explain the sampling procedure in the analysis	Able to explain the sampling procedure in the analysis	Sampling Procedure	Assignment, Midterm exam	10
5	Able to understand the principles and procedures of proximate analysis including BK, BO, PK, LK, SK, and bomb calorimeter	Able to explain proximate analysis principles and procedures including BK, BO, PK, LK, SK, and bomb calorimeter tests	Proximate Analysis Procedures (BK, BO and PK, LK, SK) and bomb calorimeter	Lectures and discussions	Quizzes, Midterm exam	10
6	Continuation of proximate analysis				Midterm exam	5
7	Able to understand the principles and analysis procedures of	Able to explain the principles and analysis procedures of feed digestibility	Feed Digestibility Analysis	Lectures and discussions	Midterm exam	5

	feed digestibility					
8	**MIDTERM EXAM**					
9	Able to understand the types and functions of the microscope and hemocytometer	Able to explain the types and functions of the microscope and hemocytometer	Analytical Equipment (Microscope and Haemocytometer)	Lectures and discussions	Final exam	5
10	Able to understand the types and functions of the spectrophotometer.	Able to explain the types and functions of the spectrophotometer.	Analytical Equipment (Spectrophotometer)	Lectures and discussions	Final exam	5
11	Able to understand the types and functions of chromatography	Able to explain the types and functions of chromatography	Analytical Equipment (Chromatography)	Lectures and discussions	Assignment, Final exam	10
12	Able to understand the electrophoresis procedure and its application	Able to explain the electrophoresis procedure and its application	Electrophoresis Procedure	Lectures and discussions	Quizzes, Final exam	10
13	Able to understand the principles and analysis procedures of amino acid and fatty acid	Able to explain the principles and analysis procedures of amino acid and fatty acid	Analysis Procedures of Amino Acid and Fatty Acid	Lectures and discussions	Final exam	7,5

14	Able to understand the reliability	Able to explain the reliability	Reliability	Lectures and discussions	Final exam	7,5
15	Able to understand the analysis procedures for meat, milk, and eggs.	Able to explain the analysis procedures for meat, milk, and eggs.	Analysis procedures for meat, milk, and eggs.	Lectures and discussions	Final exam	10
16	**FINAL EXAM**					100%

CLO:

1. Able to identify, explain the functions and work procedures of laboratory equipment.
2. Able to understand and explain laboratory analysis techniques in animal science.
3. Able to explain and implement workplace safety and security in the laboratory.

RUBRICS FOR ASSESSMENT

	UNIVERSITY OF BRAWIJAYA FACULTY OF ANIMAL SCIENCE DEPARTMENT OF ANIMAL SCIENCE UNDERGRADUATE STUDY PROGRAM OF ANIMAL SCIENCE		
Course	Instrumentation and Analysis Techniques Laboratory		
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 **PLO 7**: Able to demonstrate independent, quality, and measurable performance (both quality and quantity) effectively, efficiently, and sustainably **CLO 1:** Able to identify, explain the functions and work procedures of **laboratory equipment**.			
Very Good (4)	Able to identify, explain the functions and work procedures of laboratory equipment comprehensively	80-100	
Good (3)	Able to identify, explain the functions and work procedures of laboratory equipment **properly.**	70-79	

Moderate (2)	Able to identify, explain the functions and work procedures of laboratory equipment **quite well**	60-69	
Poor (1)	Able to identify, explain the functions and work procedures of laboratory equipment **poorly**	<60	
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 **PLO 7**: Able to demonstrate independent, quality, and measurable performance (both quality and quantity) effectively, efficiently, and sustainably **CLO 2: Able to understand and explain laboratory analysis techniques in the field of animal science.**			
Very Good (4)	Able to understand and explain laboratory analysis techniques in the field of animal science **comprehensively**	80-100	
Good (3)	Able to understand and explain laboratory analysis techniques in the field of animal science **properly**	70-79	
Moderate (2)	Able to understand and explain laboratory analysis techniques in the field of animal science quite well	60-69	
Poor (1)	Able to understand and explain laboratory analysis techniques in the field of animal science **poorly**	<60	
Score Level	CLO and PLO	Conversion	PLO score

PLO 3: Demonstrate attitudes of friendly and caring about animal welfare and permissible (halal) consumption. **PLO 7**: Able to demonstrate independent, quality, and measurable performance (both quality and quantity) effectively, efficiently, and sustainably **CLO 3: Able to explain and implement workplace safety and security in the laboratory.**			
Very Good (4)	Able to explain and implement laboratory safety and security **very well**	80-100	
Good (3)	Able to explain and implement laboratory safety and security **properly**	70-79	
Moderate (2)	Able to explain and implement laboratory safety and security **quite well**	60-69	
Poor (1)	Able to explain and implement laboratory safety and security poorly	<60	

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
Midterm Exam	30	35	30	35
Final Exam	30	40	60	
Practicum	30	30	40	30
Assignment (**week 4 and week 11)**	5	50	50	
Quizzes **(week 5 and week 12)**	5	35	35	30
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

PLO

1. LO 3: Demonstrate attitudes of friendly and caring about animal welfare and permissible (halal) consumption.
2. 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
3. LO 7: Able to demonstrate independent, quality, and measurable performance (both quality and quantity) effectively, efficiently, and sustainably

CLO:

1. Able to identify, explain the functions and work procedures of laboratory equipment.
2. Able to understand and explain laboratory analysis techniques in the field of animal science.
3. Able to explain and implement laboratory safety and security.

CLO	CLO Score	CLO Weight		PLO	
			PLO 3	PLO 6	PLO 7
CLO 1				60	40
CLO 2				60	40
CLO 3			40		60

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

Lecture Portfolios

	UNIVERSITY OF BRAWIJAYA **FACULTY OF ANIMAL SCIENCE** **STUDY PROGRAM OF ANIMAL SCIENCE**		
Course: Instrumentation and Analysis Techniques Laboratory	Code: PEF60002	RMK :	Semester: Two (Dua)
Lecturer	1. Hartutik, Prof. Dr. Ir., MP. IPU. ASEAN Eng (Koordinator MK) 2. Siti Chuzaemi, Prof. Dr. Ir., MS. IPU. ASEAN Eng 3. Marjuki, Dr. Ir., M.Sc 4. Puguh Surjowardojo, Dr. Ir. MS 5. Tri Eko Susilorini, Dr. Ir. MS. IPM. ASEAN Eng 6. Muharlien, Dr. Ir. MP 7. Manik Eirry Sawitri, Dr. Ir.MS. 8. Khotibul Umam A., Dr. S.Pt., MSi 9. Siti Nurul Kamaliyah, Dr.Ir.MP. 10. Abdul Manab, Dr. S.Pt.,MP 11. Dedes Amertaningtyas, Dr. S.Pt., MP. 12. Aswah Ridhowi, S.Pt., M.Sc 13. Aulia Puspita A.Y., S.Pt.MP., M.Sc 14. Firmansyah Tri Saputra,S.Pt.,M.Sc 15. Wike Andre Septian, S.Pt.,M.Si 16. Poespitasari Hazanah Ndaru, S.Pt.MP		
Introduction (Tell the explanation needed about this course, experiences that have been done)			

This course discusses: 1. Work regulations in the laboratory 2. Work safety in the laboratory (from chemicals and work procedures) 3. Implementing good and safe work standards (SOP, Standard Operational Procedure) in the laboratory, in the practicum and research activities ISO 17025/2005, 9001/2008 and *Good Laboratory Practice* (GLP).	
1	**Objectives** (Describe the objectives of general and specific course) = CLO
	1. Able to identify, explain the functions and work procedures of laboratory equipment. 2. Able to understand and explain laboratory analysis techniques in the field of animal science. 3. Able to explain and implement laboratory safety and security.
2	**Learning Strategies** (Describe the strategies used to achieve course objectives - CLO)
	Learning strategies of Laboratory Analysis Technique and Equipment course is a combination of *Teacher-Centered Learning* (TCL) and *Student-Centered Learning* (SCL).
3	**Lecture Management** (Describe the management of lectures: lectures, tutorials, practicum, assignments, quizzes, etc)
	The learning methods applied in this Laboratory Analysis Technique and Equipment course is face-to-face learning, student presentations, small group discussions, independent assignments, quizzes, and practicum.
4	**Lecture Contents** (explain their suitability with the applicable curriculum)
	The main topic in this course is: 1. Introduction 2. Work safety and security in the laboratory 3. Introduction of equipment (functions and work procedures) in the laboratory 4. Introduction to chemicals, chemical codes, and how to handle them 5. The sampling procedure in the analysis 6. Proximate analysis procedure and calorimeter bomb 7. Digestibility Analysis Procedure 8. Analytical Equipment (Microscope and Haemocytometer)

	9. Analysis Equipment (Spectrophotometer) 10. Analytical Equipment (Chromatography) 11. Electrophoresis Procedure 12. Amino acid analysis 13. Reliability 14. Analysis procedure for analysis of meat, milk, and eggs
5	**Lecture Participants** (describe the participants)
	The participants of this course are all students in semester 2 (two) of the Faculty of Animal Science, Universitas Brawijaya
6	**Percentage of Attendance** (% attendance of lecturers;% attendance of students)
	1) Lecturer attendance 100% 2) Lecture: Duration 100 minutes/meeting (14 meetings) 3) Practicum 50 minutes/meeting (14 meetings) 4) Structured Assignments/Quizzes/Group Presentations 5) Attendance: 80 % of the total attendance
7	**Evaluation System** (explain homework, quizzes, group assignments, practicum, etc.)
	Midterm Exam: 30% Final Exam:30 % Pass the Practicum Exam:30 % Structured Assignments/Quizzes:10%
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)
10	**Obstacles** (Describe the main barriers to learning)
	- Filled in by each lecturer at the end of the lecture - For example, inadequate practicum equipment results in the students lack performance

	- Student competence skills are lacking
11	**Distribution of score** (provide the distribution of score following the learning outcomes of this course)
	Midterm Exam: 30% Final Exam:30 % Pass the Practicum Exam:30 % Structured Assignments/Quizzes:10%
12	**Conclusion**
	Filled in by each lecturer at the end of the lecture
13	**Recommended Improvement**
	Filled in by each lecturer at the end of the lecture
	Appendices:
	1. 2. Etc.