PORTFOLIO OF THE COURSE OF IDENTIFICATION OF PLANT DISEASE (PPT 3108)

ODD SEMESTER OF 2021

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STUDY PROGRAM OF PLANT PROTECTION
DEPARTMENT OF PLANT PEST AND DISEASE
FACULTY OF AGRICULTURE
UNIVERSITAS SRIWIJAYA
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I. INTRODUCTION

The course Identification of Plant Disease is an elective course in the 2015 Curriculum but had been changed to be a compulsory course in the 2021 curriculum of the Plant Protection Study Program. The course is offered to third-year students or semester V, from September to December. The course has no specific requirement and every student of semester V can attend the course. The course is delivered in the form of face-to-face lecturing and some topics are given in the form of case studies and a project. Assignments are given in the form of case studies, project reports, and final examinations. The final examinations were in the form of answering the question in short essays. For the last semester (odd semester of 2021), the number of students who attended the course was 77 students divided into 2 classes (A and B). All of the participants were the students of Plant Protection Study Program, Faculty of Agriculture, Universitas Sriwijaya.

This portfolio is an evaluation document of planning, implementing, and evaluating the teaching and learning process of the course of Identification of Plant Disease, and also the follow up of the evaluation results with required improvement. For the stated purposes, this portfolio consists of the followings point of interest:

1. Course description
2. Course implementation
3. Course evaluation
4. Reflection
5. Course improvement
6. Appendix

II. COURSE DESCRIPTION

This course is more devoted to understanding how to identify important plant diseases, whether caused by fungi, bacteria, viruses, nematodes and phytoplasmas. The discussion includes the introduction of disease symptoms to identify the causative pathogen; distinguish symptoms of disease with signs of disease; sampling technique and handling of diseased plant samples for pathogen identification; microscopy techniques for pathogen identification; techniques for maintaining sample pathogens for identification, pathogen collection techniques; practice of identification of fungi, bacteria, nematodes, viruses and plant pathogenic phytoplasmas.

III. COURSE IMPLEMENTATION

Teaching Methods

Teaching and earning process of the course include face-to-face lecturing, either in the classroom or online via internet using Universitas Sriwijaya LMS, group discussion, case studies, and project asignment. Assignments are given in the form of case studies, project reports, and final examinations. The final examinations were in the form of answering the question in short essays.

Learning outcomes assigned to the course (Course Learning / CLO) and weekly competence (Sub-CLO) to be achieved by students are systematically arranged in the semester learning plan (SLP) of the course (Appendix 1). The intended learning outcomes assigned to the course are as follow:

CLO-1: Students are able to master theoretical concept theoretical concepts in the field of plant protection which includes causes, symptoms of the damage, influencing factors, losses incurred, and control techniques.

CLO-2: Students are able to apply representative sampling techniques for observation and disease in large populations.

CLO-3: Able to identify pests and plant pathogens quickly and accurately based on symptoms, macroscopic, microscopic, and molecular techniques.

CLO4: Students are able to communicate aspects of plant protection in an attractive, efficient, effective and productive manner.

The achievement of the CLO-1 is driven by the first-week learning material. The Sub-CLO is as follow:

Sub-CLO 1: Students are able to explain the process of diagnosing plant diseases and their role in overcoming cases of plant diseases.

The achievement of the **CLO-2** is driven by the second-week learning material. The Sub-CLO is as follows:

Sub-CLO2: Students are able to explain how to apply disease survey techniques, representative sample collection and handling for disease observation in small, medium and large populations.

The achievement of the **CLO-3** is driven by the third-week learning material. The Sub-CLO is as follows:

Sub-CLO 3. Students are able to report disease survey, representative sample collection and handling for disease observation in small, medium and large populations.

CLO 4. Students are able to recognize and identify plant pests and pathogens.

The achievement of the **CLO-3** is driven by the fourth-week learning material. The Sub-CLO is as follows:

Sub-CLO 4. Students are able to describe symptoms and signs of disease, and measure the damage.

Sub-CLO 5: Students are able to distinguish diseases caused by pathogens and non-pathogens and apply testing procedures.

Sub-CLO 6: Students are able to apply procedures to identify diseases caused by fungi.

Sub-CLO 7: Students are able to apply morphological fungal disease identification procedures.

Sub-CLO 8: Students are able to apply molecular fungal disease identification procedures.

Sub-CLO 9: Students are able to report the results of the identification of diseases caused by fungi.

Sub-CLO 10: Students are able to apply procedures to identify diseases caused by bacteria.

Sub-CLO 11: Students are able to apply procedures to identify diseases caused by bacteria.

Sub-CLO 12: Students are able to report the Koch postulated test of plant pathogenic bacteria.

Sub-CLO 13: Students are able to apply procedures to identify diseases caused by viruses and phytoplasmas.

Sub-CLO 14: Students are able to report and apply transmission tests of diseases caused by viruses.

Sub-CLO 15: Students are able to apply procedures to identify diseases caused by nematodes.

Sub-CLO 16: Students are able to apply and report transmission tests as a procedure for identifying diseases caused by nematodes.

Course Delivery

The teaching and learning process of the course of Identification of Plant Disease was conducted in accordance to the Indonesian National Standard of Higher Education which every credit of lecture should be delivered in face-to-face lecture delivery for 50 minutes, structured assignment for 60 minutes, and personal learning assignment for 60 minutes. Face-to-face lecture was given in both face-to-face in the classroom and online lecturing via internet. Case studies and projects were performed mostly in the field and shade house, while the laboratory works were used only for microscopic examination.

Course delivery in the classroom was made as effective as possible and students were encouraged to be active during the learning process. Group discussion was also arranged to give students more opportunities to participate in the learning process. Structured assignment was frequently given in the form of paper assignment. Students were given certain topics related to the learning materials and given time to complete the assignment. Personal learning is commonly given in the form of reading recommended material to broaden their knowledge and insight related to plant viruses.

Two lecturers assigned to the teaching team of the course (Suwandi and Harman Hamidson) took part in the lecturing process according to the topics determined in the Semester Lecturing Plan using the most suitable method to the materials delivered.

Assessment Method

During and after the teaching and learning process, evaluations were made as parameters of the achievement made by students in relation to the intended learning outcome (CLO) and sub-CLOs. Various methods of assessment were conducted in order to precisely measured the knowledge and skill gained by students after attending the source or weekly learning process. The assessment conducted included: case study and project of plant disease identification, midterm examination and final examination.

The relationship between assessment method and the measurement of achievement of each CLO of the course of Identification of Plant Disease are presented in the following matrix.

	Course Learning Outcomes (CLO)			
	CLO-1 (K-1)	CLO-2 (SS-16)	CLO-3 (SS-15)	CLO-4 (SS-12)
CLO1: Students are able to master theoretical concept theoretical concepts in the field of plant protection which includes causes	Paper assignment, write the research paper summaries about plant disease survey and identification (Lectures 1-2; weight 7%)			

CLO2: Students are able to apply representative sampling techniques for observation and disease in large populations				
CLO3: Able to identify pests and plant pathogens quickly and accurately based on symptoms, macroscopic, microscopic, and molecular techniques			Case study report on a molecular identification of fungi and bacteria (Lecture 8 and 11; weight 14%)	
CLO 4. Able to communicate aspects of plant protection in an attractive, efficient, effective and productive manner.			Mid-term project progress report (Lecture 3–7,9; weight 51%)	
			Final project progress report (Lecture 10, 12–16; weight 28%)	

Figure 1. Matrix showing the relationship between assessment method and the measurement of each CLO achievement

The teaching team leader coordinated the evaluation process and determined the scoring system (Appendix 2). Grading of evaluation scores had been determined by the Rector of Universitas Sriwijaya for years and was used to converse numerical grade to letter grade as shown in Table 1.

Table 1. Universitas Sriwijaya grading system

No	Numerical grade	Letter grade	Grade point
1	86-100	A	4
2	71-85	B	3
3	56-70	C	2
4	40-55	D	1
5	<40	E	0

As presented in the above matrix, assessments were conducted 7 times to assess the CLO achievement. Each assessment was designed to assess the achievement of certain CLO or combination of two or more CLO, and the samples of student's worksheet of each assessment are attached in the last appendices. The details of each assessment are as follow:

1. Assignment.
   Student were assigned to write the research paper summaries about plant disease survey and identification. The essay should describe at least 3 cases of plant disease problems and solving the problem through survey and identification of the right pathogen. This assignment was aimed at evaluating the achievement of **CLO1**, sub-CLO 1 and 2(case study rubric is attached in Appendix).

2. Case study
   Student were assigned to write and present a case study report on the molecular identification procedure for identification of plant pathogenic fungi and bacteria. This assignment was aimed at evaluating the achievement of **CLO3**, sub-CLO 8 and 11 (case study rubric is attached in Appendix).

3. Mid-term Project Report
   Students were assigned to write presentation reporting their group work project on identification of 2 plant diseases caused by fungi The project works include 1) describing the symptoms and signs, 2) calculating incidence and severity, 3) measuring damage at the survey site, 4) observing environmental factors that trigger disease, 5) assessing identification books, journal or online disease identification applications for early identification of diseases, 6) performing a simple inoculation test, 7) sampling of diseased tissue and induction of spores, 8) microscopic examination, and 9) performing Koch's postulate assay. This assignment was to evaluate the achievement of **CLO3** Sub-CLO 4–7

and **CLO4** Sub-CLO 3 and 9. (Report rubric and Example of student mid-term project report are attached in Appendix)

4. Final Project Report

   Students were assigned to write presentation reporting their group work project on identification of 1 plant disease caused by bacteria, virus, phytoplasma, and nematode. The project works include 1) describing the symptoms and signs, 2) calculating incidence and severity, 3) measuring damage at the survey site, 4) observing environmental factors that trigger disease including the insect vectors, 5) assessing identification books, journal or online disease identification applications for early identification of diseases, 6) performing a simple inoculation or transmission assay, 7) sampling of diseased tissue and induction of bacterial ooze formation, 8) microscopic examination, and 9) performing Koch's postulate assay. This assignment was to evaluate the achievement of **CLO3** Sub-CLO 10, 12 13, and 15, and **CLO4** Sub-CLO 12, 14 and 16.

Lecturing Evaluation

1. Attendance evaluation

Lecturers and students' attendance were evaluated and the result are presented in the following table.

Table 2. Lecturer and students' attendance in the course of Identification of Plant Disease, Odd Semester 2021.

Class	Lecturer attendance	Student attendance
A and B	Suwandi: 9 times Harman Hamidson: 7 times	Number of students: 77; Student with ≥85% attendance: 77; Student with <85% attendance: 0

2. Teaching evaluation

Teaching and learning process evaluation was conducted by delivering questionnaire to students at the end of the semester. The questionnaire to evaluate learning process was attached in Appendix 3. In general, the students' opinion about the learning process can be summarized as follow:

a. Most, but not all, learning materials delivered in the course were in accordance to the subject detailed in the SLP.
b. Students could easily find learning resources in the library and internet
c. The way the lecturer teaching in the classroom was very good and could lead the class comfortably.
d. Lecturers were not always arrived in the class room on time and sometimes left the classroom before the time was over. Some times the lecturer came to the classroom about 10-minute late.

e. The way lecturer communicated with students was excellent and very satisfying.
f. Questions given in the quiz and exams were expectable as outlined in the SLP
g. The difficulty of midterm and final exams was acceptable because most questions were in line with the material delivered in the course.
h. The score of every exam was predictable and students were given opportunity to take remedial exam when necessary. However, students were less satisfied with the transparence of the marks they got, since not all exam work sheet or answer sheet were given back to students after being marked.
i. Most, but not all, of learning materials were uploaded in the E-learning system
j. All structured assignment were in accordance with those declared in SLP
k. All examination were conducted according to schedule in the SLP
l. Lectures were delivered 16 times including final report as examination, the same as written in the SLP, 16 meetings.

Based on the summary of the lecturing process evaluation, lecturers of Identification of Plant Disease need to adjust their arrival time in the class room to avoid being late, or at least let the students know in case the lecturer should arrive late for certain reason. Other correction also required in relation to uploading learning material in e-learning system. Not all lecturers aware about this matter, so more serious effort should be taken to tidy up the mess.

3. Result Evaluation

a. Student grade achievement

Final score and grade achieved by students at the end of semester derived from proportional accumulation of various assessment method conducted to evaluate the achievement of learning outcome of the lecture and also of each learning subject. Methods of assessment and contribution weight of each method are presented in Table 3 and the score grading follow the Universitas Sriwijaya regulation as presented in Table 1.

Table 3. Method of assessment and contribution weight to the final score

No	Assessment method	Weight (%)
1	Paper assignment	7
2	Case study report	14
3	Mid project report	51
4	Final project report	28

The distribution of grades attained by students in the class of Identification of Plant Disease 2021 are presented in the following Table 4, where we can see the most students (88.3%) could achieve the highest grade (A) and 8 students (10.4%) achieved grade B and

unfortunately there were 1 student could not completely attend the class and retreated from the course.

Table 4. Distribution of grades achievement of the students attending Identification of Plant Disease 2021

No	Letter grade	Numerical students	Percent
1	A	68	88.3
2	B	8	10.4
3	C	0	0.0
4	D	1	1.3
5	E	0	0.0

b. CLO achievement

In the evaluation of CLO achievement, each student was evaluated for his/her achievement on the intended learning outcome (CLO) consisted of CLO1, CLO2, CLO3, and CLO4 (Appendix 3). The CLO achievement was calculated and evaluated individually for each student and achievement of the class (Appendix 4). Similar to the fact that most of student (88.3%) gained grade A, the CLO achievement also showed the same results, that most students 88.3%) could achieve all CLO (1 to 4) and only few students fail to achieve the CLOs. The percentage of students got grade B and lower was the same as the percentage of students fail to pass all CLOs, but the names of the students were different. The achievement of **CLO** was generally very good. None of student totally failed to achieve all **CLOs**. However, there were also students failed in certain **CLOs** but succeed in achieving other CLO. Two students failed to achieve **CLO1**, 2 students failed to achieve **CLO2**, 8 students failed to achieve **CLO3** and 9 students failed to achieve **CLO4**.

In the calculation of the classroom achievement, surprisingly, the average score of the class was **89.3** at grade **A** and the achievement of **CLO** was not as expected, because the class could only achieve **CLO1** and **CLO2** and but failed to achieve **CLO3** and **CLO4**. This was certainly caused by the failure of some student in performing procedure for identification of bacteria and nematode.

IV. REFLECTION

Based on the evaluation results, the grade achieved by Students attending Identification of Plant Disease course in even semester of 2021 was quite satisfying, even though there were one student failed to complete the course due to failure in performing final class project. The **CLO** achievement also satisfying and the failure of some students to achieve some **CLOs** was understandable because the passing grade for **CLO** achievement was set high, 85 or higher. However, based on learning process, grade, and **CLO** evaluation, it is clear that there is something did not work as expected and needs correction that all lecturers should aware of.

V. FOLLOW UP ACTION

Based on the evaluation results, some improvements are required in relation to the preparation, delivery and evaluation of the course of Identification of Plant Disease. The correction is necessary to avoid the similar situation occur again in the future, and to reduce the failure of **CLO** achievement. Lecturers should improve their course material and closely follow the SLP. The lecturers also have to pay more attention to their punctuality, since some students protested about the late coming of lecturer to the classroom. Learning materials should be uploaded in e-learning system as early as possible to give students more time to read before attending the lecture. Furthermore, students wanted the lecturers to given back exam answer sheet despite the lecture have announced the marks of the exams. Above all, every one involved in the learning process of Identification of Plant Disease has to update and upgrade material and method of the lecturing to guarantee that good grade and high **CLO** achievement are relevant to the latest condition of the knowledge and technology around Identification of Plant Disease.

Appendix 1. SLP/Semester Learning Plan of Plant Disease Identification

SRIWIJAYA UNIVERSITY
FACULTY OF AGRICULTURE
DEPARTMENT OF PEST AND PLANT DISEASE
PLANT PROTECTION STUDY PROGRAM

SEMESTER LEARNING PLAN

A. COURSE IDENTITY

Subject	: Plant Disease Identification	Code: PPT3108	Semester: 5	credits: 2(1-1)
Study material	: Plant Pest Organisms			
Course description	: This course is more devoted to understanding how to identify important plant diseases, whether caused by fungi, bacteria, viruses, nematodes, and phytoplasmas. The discussion includes the introduction of disease symptoms to identify the causative pathogen; distinguish symptoms of the disease from signs of disease; sampling technique and handling of diseased plant samples for pathogen identification; microscopy techniques for pathogen identification; techniques for maintaining sample pathogens for identification, pathogen collection techniques; the practice of identification of fungi, bacteria, nematodes, viruses and plant pathogenic phytoplasmas.			
CLO	CLO-1: Students are able to master theoretical concept theoretical concepts in the field of plant protection which includes causes, symptoms of the damage, influencing factors, losses incurred, and control techniques (K1). CLO-2: Students are able to apply representative sampling techniques for observation and disease in large populations (SS-16).			

	CLO-3: Able to identify pests and plant pathogens quickly and accurately based on symptoms, macroscopic, microscopic, and molecular techniques (SS-15). CLO-4: Students are able to communicate aspects of plant protection in an attractive, efficient, effective, and productive manner (SS-12).	
Lecturer support	: Prof. Dr. Ir. Suwandi, M.Agr. (SW) Dr. Ir. Harman Hamidson, MP (HH)	Responsible Lecturer : Prof. Dr. Ir. Suwandi, M.Agr. (SW)

B. LEARNING PROGRAM

CLO	Final Skills expected at each stage of learning (Sub-CLO-)	Subject	Reference	Learning method and time	Description of independent tasks and time	Indicator	Weight (%)	Lecturer
CLO-1	**Sub-CLO-1:** Able to explain the process of diagnosing plant diseases and their role in overcoming cases of plant diseases	Scope, role, and development of methods for diagnosis and identification of plant diseases	Riley, MB, MR Williamson, and O. Maloy. 2002; Kurouski, D. 2021	Lecture TM1 (2x50")	- Reading college contracts and RPS - Internet searching about plant disease cases and problem-solving through diagnosis (2x120")	Accuracy in describing at least 3 cases of plant disease problems and solving the problem through identification of the right pathogen	3	SW
CLO-2	**Sub-CLO-2.** Able to apply disease survey	Surveys, sampling, and	McMaugh, T. 2005	Project Based Learning (PjBL)	- Students design, discuss and carry out disease	Accuracy in applying survey techniques, taking	4	SW

	techniques, representative sample collection and handling for disease observation in small, medium and large populations	handling of diseased plants		survey of plant diseases - TM2 (2x50") Discussion and presentation of disease survey plan	survey projects (2x 120")	and handling diseased plant samples		
CLO-4	**Sub-CLO-3.** Able to report disease surveys, sample collection and handling representatively for disease observation in small, medium and large populations	Surveys, sampling and handling of diseased plants	McMaugh, T. 2005	TM3 (2x50") Discussion and presentation of survey project report	- Make reports and presentation of survey project results (2x120")	Accuracy in reporting survey results, taking and handling diseased plant samples	7	SW
CLO-3	**Sub-CLO-4.** Able to describe symptoms and signs of disease, and measure damage	Symptoms, signs and measures of plant diseases	Agrios GN 2005; Semangun, H. 2008a; Semangun, H. 2008b; Semangun, H. 2007	Project Based Learning (PjBL) survey of plant diseases - TM4 (2x50") Discussion and presentation of symptoms	- Perform a description of symptoms and signs, calculate incidence and severity, and measure damage at the survey site	Accurately describe symptoms and signs of disease, and measure damage (through rubrics for assessing project outcomes and presentations)	6	SW

				and measures of disease	- Make reports and presentations of descriptions of symptoms, signs, and damage from the results of the disease survey (2x120”)			
CLO-3	**Sub-CLO-5.** Able to distinguish diseases caused by pathogens and non-pathogens and apply testing procedures	Early diagnosis of disease causes (pathogenic vs non-pathogenic)	Riley, MB, MR Williamson, and O. Maloy. 2002; Hawaii Master Ardeners. 2013	Project Based Learning (PjBL) survey of plant diseases - TM5 (2x50”) Discussion and presentation of the results of the initial diagnosis of the cause of the disease	- Observing environmental factors that trigger disease - Using disease identification applications for early identification of diseases - Perform a simple inoculation test - Make reports and presentations on the initial diagnosis of the cause of the disease (2x120”)	Accuracy in describing disease triggering factors and accuracy in applying simple inoculation tests) (through the rubric for assessing project outcomes and presentations)	7	SW
CLO-3	**Sub-CLO-6.** Able to apply	Diagnosis and isolation of	Ownley, BH, Trigiano, RN	Project Based Learning (PjBL)	- Describe disease symptoms and	Accuracy in applying	7	SW

	procedures to identify diseases caused by fungi	disease-causing fungi	2016; Burns, R. 2009; Barnett, HL, Hunter, BB 1998; Refai, M., El-Yazid, HA 2014. Monograph on Dematiaceous fungi; Bolton, MD, Thomma, BPHJ 2012; Watanabe, T. 2002; Leslie, JF, Summerell, BA 2006; Semangun, H. 2008a; Semangun, H. 2008b; Semangun, H. 2007;	identification of plant pathogenic fungi (total 4 weeks TM) - TM6 (2x50") Discussion and presentation of the results of diseased tissue sampling, induction of sporulation, and in situ microscopic characterizati on	signs of pathogens - Using disease identification applications for early identification of diseases - Sampling of diseased tissue and induction of spores (2x120") - Pathogen isolation	identification procedures (description of symptoms, signs, isolation) of fungal pathogens (through the rubric for assessing project results and presentations)		
CLO-3	**Sub-CLO-7.** Able to apply morphological fungal disease identification procedures	Morphological identification of fungi	Ownley, BH, Trigiano, RN 2016; Burns, R. 2009; Barnett, HL, Hunter, BB 1998; Refai, M., El-Yazid, HA 2014. Monograph on	TM7 (2x50") Discussion and presentation of the results of isolation and microscopic characterization of cultures	- Microscopy *in situ* and on culture (2x120")	Accuracy in applying the morphological identification of pathogenic fungi (through the rubric for assessing project results and presentations)	7	SW

			Dematiaceous fungi; Bolton, MD, Thomma, BPHJ 2012; Watanabe, T. 2002; Leslie, JF, Summerell, BA 2006; Semangun, H. 2008a; Semangun, H. 2008b; Semangun, H. 2007					
CLO-3	**Sub-CLO-8.** Able to apply molecular fungal disease identification procedures	Molecular identification of fungi	Soleha, S., Muslim, A., Suwandi, S., Kadir, S., Pratama, R. 2022; Suwandi, S., Irsan, C., Hamidson, H., Umayah, A., Asriyani, KD, 2021; Suwandi, Akino, S., and Kondo, N. 2012	TM8 (2x50”) Discussion and presentation of the results of DNA isolation, PCR and sequence analysis	- DNA isolation, PCR, PCR product sequencing, sequence analysis (2x120”)	Accuracy in applying the molecular identification procedure for pathogenic fungi (through the rubric for assessing case study report)	6.5	SW

CLO-4	**Sub-CLO-9.** Able to report the results of identification of diseases caused by fungi	Koch's test of plant pathogenic fungi	Soleha, S., Muslim, A., Suwandi, S., Kadir, S., Pratama, R. 2022; Suwandi, S., Irsan, C., Hamidson, H., Umayah, A., Asriyani, KD, 2021; Suwandi, Akino, S., and Kondo, N. 2012	TM9 (2x50”) Discussion and presentation of the results of Koch's postulate test	- Doing Koch's postulate test (2x120”)	Accuracy in reporting the results of identification of diseases caused by fungi (through the rubric for assessing project results and presentations)	12	SW
CLO-3	**Sub-CLO-10.** Able to apply procedures to identify diseases caused by bacteria	Diagnosis (symptoms, signs, isolation, culture characteristics, and biochemical tests) of diseases caused by bacteria	Agrios GN 2005; Semangun, H. 2008a; Semangun, H. 2008b; Semangun, H. 2007; Ownley, BH, Trigiano, RN 2016; Valeria Scala, Nicoletta Pucci, Stefania Loreti. 2018	Project Based Learning (PjBL) identification of plant pathogenic bacteria (total 3 weeks TM) TM10 (2x50”) Discussion and presentation of the results of diseased tissue	Describe disease symptoms and signs of pathogens Using disease identification applications for the early identification of diseases sampling of diseased tissue and induction	Accuracy in applying disease identification procedures (description of symptoms, signs, isolation, culture characteristics, and biochemical tests) for diseases caused by bacteria (through the rubric for assessing project results and presentations)	7	HH

				sampling, isolation, culture characteristics, and results of biochemical characterization	of bacterial ooze Pathogen isolation Characteristics of culture and biochemical tests (2x120”)			
CLO-3	**Sub-CLO-11.** Able to apply procedures to identify diseases caused by bacteria	Molecular identification of bacteria	Valeria Scala, Nicoletta Pucci, Stefania Loreti. 2018	- TM11 (2x50”) Discussion and presentation of the results of DNA isolation, PCR and sequence analysis	- DNA isolation, PCR, PCR product sequencing, sequence analysis (2x120”)	Accuracy in applying molecular identification of bacteria (through the rubric for assessing case study report)	6.5	HH
CLO-4	**Sub-CLO-12.** Able to report and apply the Koch postulated test of plant pathogenic bacteria	Koch's test of plant pathogenic bacteria	Valeria Scala, Nicoletta Pucci, Stefania Loreti. 2018	TM12 (2x50”) Discussion and presentation of the results of Koch's postulate test	- Koch's postulate test (2x120")	The accuracy of applying Koch's postulated test procedures for plant pathogenic bacteria (through the rubric for assessing project	5	HH

						results and presentations)		
CLO-3	**Sub-CLO-13.** Able to apply procedures to identify diseases caused by viruses and phytoplasmas	Diagnosis (symptoms, types of vectors and their population) diseases caused by viruses and phytoplasma	Ownley, BH, Trigiano, RN 2016; Agrios GN 2005; Semangun, H. 2008a; Semangun, H. 2008b; Semangun, H. 2007; Wang, YM; Ostendorf, B.; Gautam, D.; Habili, N.; Pagay, V. 2022; Lacroix, C., Renner, K., Cole, E., Seabloom, EW, Borer, ET, & Malmstrom, CM 2016 ; RI Hamilton, JR Edwardson, RIB Francki, HT Hsu, R. Hull, R. Koenig, RG Milne. 1981	Project Based Learning (PjBL) identification of plant pathogenic viruses and phytoplasmas (2 weeks in total) - TM13 (2x50") Discussion and presentation of the results of symptom description, identification and vector population	- Describe disease symptoms and identify vectors - Using disease identification application for early identification of disease (2x120")	Accuracy in applying disease identification procedures (symptom description, and vector identification) for diseases caused by viruses and phytoplasmas (through the rubric for assessing project results and presentations)	7	HH
CLO-4	**Sub-CLO-14.** Able to report and apply	Mechanical transmission of diseases caused	Wang, YM; Ostendorf, B.; Gautam, D.;	TM14 (2x50") Discussion and presentation of	- Mechanical transmission test (2x120")	Accuracy in implementing and reporting disease	4	HH

	transmission test of disease caused by virus	by viruses and phytoplasmas	Habili, N.; Pagay, V. 2022; Lacroix, C., Renner, K., Cole, E., Seabloom, EW, Borer, ET, & Malmstrom, CM 2016; RI Hamilton, JR Edwardson, RIB Francki, HT Hsu, R. Hull, R. Koenig, RG Milne. 1981	test results of mechanical transmission of viral diseases		identification procedures (mechanical transmission tests) of diseases caused by viruses and phytoplasmas (through the rubric for assessing project results and presentations)		
CLO-3	**Sub-CLO-15.** Able to apply procedures to identify diseases caused by nematodes	Diagnosis (symptoms, population, body morphology, and infectious test) of diseases caused by nematodes	Agrios GN 2005; Semangun, H. 2008a; Semangun, H. 2008b; Carneiro, RMDG, de Oliveira Lima, FS, & Correia, VR 2017	Project Based Learning (PjBL) identification of plant pathogenic nematodes (total 2 weeks TM) - TM15 (2x50") Discussion and presentation of the results of the description of symptoms,	- Perform a description of disease symptoms, population calculations, and descriptions of body morphology - Using disease identification application for early identification of disease (2x120")	Accuracy in applying the procedure for identifying plant pathogenic nematodes based on disease symptoms, population, and morphological descriptions (through the rubric for assessing project results and presentations)	7	HH

				population, and body morphology				
CLO-4	**Sub-CLO-16.** Able to apply and report the infectious test as a procedure for identifying diseases caused by nematodes	Nematode infection test	Carneiro, RMDG, de Oliveira Lima, FS, & Correia, VR	- TM16 (2x50") Discussion and presentation of infectious test results	- Contagion test (2x120")	Accuracy in applying infectious test procedures for the identification of diseases caused by nematodes (through the rubric for assessing project results and presentations)	4	HH

Work load: TM lecture 1600 minutes, independent assignments 3840 minutes = 5440 minutes = 90.67 hours = **3.63 ECTS**

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Appendix 2. Rubric of assignment

Appendix 2.1. Rubric of paper assignment

Value	Criteria	Result
90-100	Complete summary of 3 cases of plant diseases identifications covering all 7 aspects of identification (disease survey, symptom, damage, predisposing factor, morphological and molecular identification and postulate Koch)	
80-89	Complete summary of 3 cases of plant diseases identifications with incomplete of 7 aspects of identification (disease survey, symptom, damage, predisposing factor, morphological and molecular identification and postulate Koch)	
70-79	Complete summary of 2 cases of plant diseases identifications covering all 7 aspects of identification (disease survey, symptom, damage, predisposing factor, morphological and molecular identification and postulate Koch)	
60-69	Complete summary of 2 cases of plant diseases identifications with incomplete of 7 aspects of identification (disease survey, symptom, damage, predisposing factor, morphological and molecular identification and postulate Koch)	
50-59	Complete summary of 1 cases of plant diseases identifications covering all 7 aspects of identification (disease survey, symptom, damage, predisposing factor, morphological and molecular identification and postulate Koch)	
40-49	Complete summary of 1 cases of plant diseases identifications with incomplete of 7 aspects of identification (disease survey, symptom, damage, predisposing factor, morphological and molecular identification and postulate Koch)	

Appendix 2. Rubric of assignment

Appendix 2.1. Rubric of paper assignment

Value	Criteria	Result
90-100	Complete summary of 3 cases of plant diseases identifications covering all 7 aspects of identification (disease survey, symptom, damage, predisposing factor, morphological and molecular identification and postulate Koch)	
80-89	Complete summary of 3 cases of plant diseases identifications with incomplete of 7 aspects of identification (disease survey, symptom, damage, predisposing factor, morphological and molecular identification and postulate Koch)	
70-79	Complete summary of 2 cases of plant diseases identifications covering all 7 aspects of identification (disease survey, symptom, damage, predisposing factor, morphological and molecular identification and postulate Koch)	
60-69	Complete summary of 2 cases of plant diseases identifications with incomplete of 7 aspects of identification (disease survey, symptom, damage, predisposing factor, morphological and molecular identification and postulate Koch)	
50-59	Complete summary of 1 cases of plant diseases identifications covering all 7 aspects of identification (disease survey, symptom, damage, predisposing factor, morphological and molecular identification and postulate Koch)	
40-49	Complete summary of 1 cases of plant diseases identifications with incomplete of 7 aspects of identification (disease survey, symptom, damage, predisposing factor, morphological and molecular identification and postulate Koch)	

Appendix 2.2. Rubric of case study report

Value	Criteria	Result

90-100	Complete explanation of 3 cases of molecular identification of plant pathogen covering DNA isolation, primer and PCR, and sequence analyses	
80-89	Complete explanation of 3 cases of molecular identification of plant pathogen covering DNA isolation, primer and PCR, and sequence analyses	
70-79	Complete explanation of 3 cases of molecular identification of plant pathogen covering DNA isolation, primer and PCR, and sequence analyses	
60-69	Complete explanation of 3 cases of molecular identification of plant pathogen covering DNA isolation, primer and PCR, and sequence analyses	
50-59	Complete explanation of 3 cases of molecular identification of plant pathogen covering DNA isolation, primer and PCR, and sequence analyses	
40-49	Complete explanation of 3 cases of molecular identification of plant pathogen covering DNA isolation, primer and PCR, and sequence analyses	

Appendix 2.3. Rubric of project report

Value	**Criteria**	**Result**
90-100	Complete and correct assessment of 5 aspects of plant disease identification: 1) disease survey, disease measurement, and sampling; 2) symptom description; 3) characterization of predisposing factor; 4) morphological identification; and 5) postulate Koch.	
80-89	Complete and correct assessment of 4 aspects of plant disease identification	
70-79	Complete and correct assessment of 3 aspects of plant disease identification	
60-69	Complete and correct assessment of 2 aspects of plant disease identification	

50-59	Complete and correct assessment of 1 aspects of plant disease identification	

Appendix 3

QUESTIONNAIRE FOR THE FEEDBACK OF TEACHING PROCESS
PLANT PROTECTION STUDY PROGRAMME
FACULTY OF AGRICULTURE, UNIVERSITAS SRIWIJAYA

All students of Plant Protection Study Programme are expected to fill out this questionnaire honestly. This questionnaire is designated to appreciate and or to criticize the performance of all lecturers in Teaching Process conducted in Plant Protection Study Program, Faculty of Agriculture, Universitas Sriwijaya. No student's personal information, e.g. Name, ID Number, Mobile Number, et cetera, are requested. Students need to tick (√) the option beside the number in box of every question which is chosen.

Evaluated lecturer's name :…….

Subject taught :…….

1	Suitability of course content to those published in Semester Learning Plan	Unsuitable	Less suitable	Suitable	Very suitable
		1	2	3	4
2	Easiness of getting learning resources	Not easy	Less easy	Easy	Very easy
		1	2	3	4
3	Teaching approach	Not interesting	Less interesting	Interesting	Very interesting
		1	2	3	4
4	Classroom management	Fairly good	Good	Very good	excellent
		1	2	3	4
5	Timekeeping ability	Unpunctual	Less punctual	Punctual	Very punctual
		1	2	3	4
6	Communication skill	Ineffective	Less effective	Effective	Very effective
		1	2	3	4

7	Suitability of questions in examinations to the course content	Unsuitable	Less suitable	Suitable	Very suitable
		1	2	3	4
8	Difficulty of question in the examinations	Very easy	Easy	Less difficult	Difficult
		1	2	3	4
9	Closeness of gained mark with student's expectation	Far	Close	Very close	Precise
		1	2	3	4
10	Availability of learning materials in the e-learning system	Not uploaded	Uploaded in the same day of lecture	Uploaded within three days before lecture's day	Uploaded a week before lecture's day
		1	2	3	4
11	Suitability of assignments to course content published in Semester Learning Plan	Unsuitable	Less suitable	Suitable	Very suitable
		1	2	3	4
12	Execution of midterm and final examinations	Not done at all.	Done, but not as scheduled	Done as scheduled, but different from schedule in Semester Learning Plan	Done as scheduled in Semester Learning Plan
		1	2	3	4
13	Number of lectures delivered for the entire semester.	Less than 12 times	12-13 times	14-15 times	16 times
		1	2	3	4

This part will be filled in by Study Program Administrator or Quality Assurance Task Staff

Final score = $\frac{\Sigma x_i}{Nz} \times 100$ Predicate

X_i = score of each answered question

N = number of question

Z = highest score

< 55: not good

55-70: fairly good

>70-85: good

>85: very good

Conclusion : …….

Appendix 4. Score sheet of the course of Identification of Plant Disease

STUDY PROGRAM: PLANT PROTECTION
ACADEMIC YEAR: 2021/2022 (ODD SEMESTER)
COURSE: PLANT DISEASE IDENTIFICATION (2 CREDITS) - CLASS A
ROOM: R. SEMINAR HPT
LECTURER: DR. IR. SUWANDI, M.AGR. / DR. IR. HARMAN HAMIDSON, M.P.
TIME: WEDNESDAY (13:20 - 14:10 WIB)

									CLO Achievement			
NO.	SIN	Name of Student	Assignment	Case study	Mid Project	Final Project	Final Score	Grade	CLO1	CLO2	CLO3	CLO4
1	05081181924002	RIAN ADRIAN	87	95	98	80	89.6	A	YES	YES	YES	YES
2	05081181924004	HERDINAWATI	87	93	90	80	86.2	A	YES	YES	YES	YES
3	05081181924005	LIDYA KARLINA	92	92	94	80	88.0	A	YES	YES	YES	YES
4	05081181924006	RIA LESTARI	88	96	90	85	88.6	A	YES	YES	YES	YES
5	05081181924009	INDAH WULAN SUCI	95	92	89	90	90.2	A	YES	YES	YES	YES
6	05081181924012	CINDI AZZAHRA	96	90	90	80	86.4	A	YES	YES	YES	YES
7	05081181924076	NURCAHAYA PURBA	93	90	100	80	90.2	A	YES	YES	YES	YES
8	05081181924078	SITI MAHANI	93	90	100	85	92.2	A	YES	YES	YES	YES
9	05081181924079	ANGGUN DAMAR ADELIA	89	94	90	80	86.5	A	YES	YES	YES	YES
10	05081181924082	MERI AGUSTIN	83	94	91	80	86.4	A	YES	YES	YES	YES
11	05081281924019	MEIRIZQI NURLAILATUS SHOLICHAH	84	98	92	90	91.4	A	YES	YES	YES	YES
12	05081281924020	SHINTA AMALIA RAHMADANI	92	89	89	75	83.6	B	YES	YES	NO	NO
13	05081281924021	SHAKEILLA ARETHA ZELIKA	93	90	90	90	90.2	A	YES	YES	YES	YES
14	05081281924029	HESTI	90	90	89	85	87.6	A	YES	YES	YES	YES
15	05081281924031	ESTER MAHARANI	95	89	89	85	87.8	A	YES	YES	YES	YES
16	05081281924033	FARID ALGIFANI	96	88	90	80	86.2	A	YES	YES	YES	YES
17	05081281924034	MUHAMMAD AL FATIH ABDURROSYID	98	90	90	80	86.6	A	YES	YES	YES	YES

18	05081281924037	MUTIARA RAIHANAH ALIFIA	89	92	90	80	86.2	A	YES	YES	YES	YES
19	05081281924039	ARDHANSYAH PRADANA MAULANA LATIF	87	98	90	80	86.8	A	YES	YES	YES	YES
20	05081281924040	AMARISYA SHAFA LUZIA	86	98	95	86	91.2	A	YES	YES	YES	YES
21	05081281924041	M BAGAS TIYANTARA	94	88	99	80	89.6	A	YES	YES	YES	YES
22	05081281924043	ANDES TRIANI	97	89	94	85	90.0	A	YES	YES	YES	YES
23	05081281924044	MUHAMMAD ASDHYSHANI	90	90	89	75	83.6	B	YES	YES	NO	NO
24	05081281924069	YUSI ANANDA	93	93	94	86	90.6	A	YES	YES	YES	YES
25	05081281924070	NYAYU FARLANIA WULANDARI	87	92	90	75	84.1	B	YES	YES	YES	NO
26	05081281924075	ZAHRATUL FAUZIAH	94	89	92	85	89.0	A	YES	YES	YES	YES
27	05081281924077	EGO ALPIAN	96	88	90	75	84.2	B	YES	YES	NO	NO
28	05081281924080	LOVIGA BR BANGUN	95	89	100	75	88.2	A	YES	YES	YES	YES
29	05081381722045	WANDA HELMI RIANSYAH	93	90	65	0	44.2	D	YES	YES	NO	NO
30	05081381924047	KHAIRUNNISA PUTRI	88	91	99	75	87.6	A	YES	YES	YES	YES
31	05081381924048	AZZAHRA NUR DWI LESTARI	91	94	92	90	91.4	A	YES	YES	YES	YES
32	05081381924053	ROHIMA RAHMAH	92	94	90	80	86.7	A	YES	YES	YES	YES
33	05081381924054	RONI SALEH ARDIANSYAH	92	90	98	85	91.3	A	YES	YES	YES	YES
34	05081381924055	ERDI MEFIYANTO	94	94	89	90	90.4	A	YES	YES	YES	YES
35	05081381924056	PUTRI GINA	93	93	95	80	88.6	A	YES	YES	YES	YES
36	05081381924058	RILWA WALLINGGA	87	92	89	86	88.1	A	YES	YES	YES	YES
37	05081381924059	RAUDHATUL FATRICIA	88	94	99	90	94.0	A	YES	YES	YES	YES
38	05081381924060	DWI RAHAYU PUTRI SIANIPAR	90	93	95	90	92.4	A	YES	YES	YES	YES
39	05081381924063	MUHAMMAD HASANUL ICHSAN	88	94	98	86	92.0	A	YES	YES	YES	YES

STUDY PROGRAM : PLANT PROTECTION
ACADEMIC YEAR : 2021/2022 (ODD SEMESTER)
COURSE : PLANT DISEASE IDENTIFICATION (2 CREDITS) - CLASS B
ROOM : R. LAB INSECTARIUM
LECTURER : DR. IR. SUWANDI, M.AGR. / DR. IR. HARMAN HAMIDSON, M.P.
TIME : FRIDAY (07:30 - 08:20 WIB)

CLO Achievement

NO.	SIN	Name of Student	Assignment	Case study	Mid Project	Final Project	Total Value	Grade	CLO1	CLO2	CLO3	CLO4
1	05081181924001	VIRA PUSPITASARI	94	90	92	90	91.08	A	YES	YES	YES	YES
2	05081181924003	DHANILLO DJULIAN	92	94	89	86	88.66	A	YES	YES	YES	YES
3	05081181924007	KARINA AYUNINGTIAS	92	92	94	80	88	A	YES	YES	YES	YES
4	05081181924010	MIFTAH AJENGTIYAS NURSYAHIDAH RAHMAN	91	90	100	85	92.07	A	YES	YES	YES	YES
5	05081181924011	NURUL TRIAGTIN	91	91	90	80	86.2	A	YES	YES	YES	YES
6	05081181924013	SEPTYA AYU DWINTHA	94	91	94	85	90.01	A	YES	YES	YES	YES
7	05081181924071	ELLA APRIYANA	88	94	94	80	87.98	A	YES	YES	YES	YES
8	05081281924014	DELLA APRILIA	92	95	94	90	92.39	A	YES	YES	YES	YES
9	05081281924015	IRFAN MOHANDIS HARAKI	95	95	92	86	90.2	A	YES	YES	YES	YES
10	05081281924017	MESSA SYAHPUTRI	88	92	100	80	90.12	A	YES	YES	YES	YES
11	05081281924018	RIZKI PUTRI AMELIA	93	92	92	90	91.27	A	YES	YES	YES	YES
12	05081281924022	KHAIRI SARDILLA	90	95	92	86	89.85	A	YES	YES	YES	YES
13	05081281924023	MUHARI	94	90	99	80	89.88	A	YES	YES	YES	YES
14	05081281924024	DEO DATUS CRISTY PUTRA SIRAIT	92	92	93	86	90	A	YES	YES	YES	YES
15	05081281924027	RANTI NUR FADILLAH	90	92	93	80	87.46	A	YES	YES	YES	YES
16	05081281924028	HUSAINI PURNAMA AJI	95	92	100	80	90.61	A	YES	YES	YES	YES
17	05081281924032	WINDA PRATIWI	91	92	89	86	88.33	A	YES	YES	YES	YES
18	05081281924035	AGUSTIAN KANDILA	91	92	89	90	89.93	A	YES	YES	YES	YES
19	05081281924036	HANA ELJA AZZAHRA	91	93	90	80	86.46	A	YES	YES	YES	YES

20	05081281924038	HELMI SYAPUTRA	91	92	89	86	88.33	A	YES	YES	YES	YES
21	05081281924045	SHERA MARGARETHA	95	90	92	90	91.15	A	YES	YES	YES	YES
22	05081281924072	TIKA RAHMAWATI	89	92	94	80	87.79	A	YES	YES	YES	YES
23	05081281924073	RAJA BONAR LUBIS	92	93	99	80	90.13	A	YES	YES	YES	YES
24	05081281924074	TEZZIA NOFETRA	92	92	93	90	91.6	A	YES	YES	YES	YES
25	05081281924081	MEINI FITRIANA	88	91	89	75	83.59	B	YES	YES	NO	NO
26	05081281924083	NUR AMALIA NASUTION	92	92	92	86	89.6	A	YES	YES	YES	YES
27	05081381924046	NANDA WAHYU SURYANA	91	93	99	80	90.06	A	YES	YES	YES	YES
28	05081381924049	SARAH CAHYANI AHMAD	91	89	94	86	89.94	A	YES	YES	YES	YES
29	05081381924050	MUHAMMAD MUIS	92	92	88	85	87.6	A	YES	YES	YES	YES
30	05081381924051	EDHO ARYA SAPUTRA	89	90	87	75	82.73	B	YES	YES	NO	NO
31	05081381924052	FAHMI NUR ILHAM FAJAR	94	93	90	80	86.67	A	YES	YES	YES	YES
32	05081381924057	LUTFIAH PUTRI AZZAHRA	88	90	89	75	83.46	B	YES	YES	NO	NO
33	05081381924061	MUHAMMAD WILDAN AL GHIFARY	88	91	89	75	83.59	B	YES	YES	NO	NO
34	05081381924062	NOVI ARISKA	94	90	90	80	86.28	A	YES	YES	YES	YES
35	05081381924065	REYDO NUGRAHA	89	91	87	85	86.86	A	YES	YES	YES	YES
36	05081381924066	VERA FADHLIA AMY	89	94	93	85	89.65	A	YES	YES	YES	YES
37	05081381924067	AJENG TRI MUGHNIY	91	95	93	85	89.92	A	YES	YES	YES	YES
38	05081381924068	PENDI LUKITO	88	91	93	80	87.19	A	YES	YES	YES	YES

Percentage of student achievement			
	Grade	Count	Percent
	A	68	88.31
	B	8	10.39
	C	0	0.00
	D	1	1.30
	E	0	0.00
	Total	77	

CLO	Count "YES"	Percent "YES"
CLO1	77	100
CLO2	77	100
CLO3	69	89.61
CLO4	68	88.31
All CLOs	68	88.31

Grade, YES for CLO achievement >=85 and No for CLO achievement <85)

CLO Calculation for individual student in the class Identification of Plant Disease (Rian Adrian)

Name of Student : RIAN ADRIAN

SIN : 05081181924002

No	Assessment	Material	Weight	Score	W* S	CLO1	CLO2	CLO3	CLO4
1	Assignment	Lec. 1,2	0.07	87	6.09	2.61	3.48		
2	Case study	Lec. 8,11	0.14	95	13.3			13.3	
3	Midterm project	Lec. 3-7,9	0.51	98	49.98			28.42	21.56
4	Final project	Lec.10, 12-14	0.28	80	22.4			12	10.4
Total/final score					91.77	2.61	3.48	53.72	31.96
Grade					A	3	4	58	35
CLO achievement (%)						87	87	92.62069	91.31429
Minimum CLO achievement 85%						YES	YES	YES	YES

Appendix 5. Samples of Student Midterm Report Project

No.	Project title (Student group)	Midterm project report (Youtube video link)
1	Identification of Diseases on lemon fruit, oil palm leaves, and cacao pod (Miftah Ajengtiyas, Messa Syahputri, Husaini Purnama Aji)	https://www.youtube.com/watch?v=7dtvvVkOiyo
2	Identification of Diseases on Pedilanthus, , pepper, and Hylocereus polyrhizus (Nurcahaya Purba Loviga Br. Bangun, Siti Mahani)	https://youtu.be/vFvKECsZLPw
3	Identification of Diseases on leaves of banana, papaya, and cucumber (M. Bagas Tiyantara, Raudhatul Fatricia, Khairunnisa Putri)	https://youtu.be/WF9UJ3E2v6U