Course Syllabus
First Semester, Academic Year 2024

1. **Faculty of Agriculture at Kamphaeng Saen** **Department of Farm Mechanics**

2. **Course code: 02027322** **Course name:** Principles of Farm Machinery II
   Credit: 3(2-3-6)
   Pre: *02027321*

3. **Instructor team:**

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4. **Providing students with access to and advice outside of class hours:**

Working days During official hours, except during teaching periods or when on official business outside of the premises. In case of emergency, students can contact us via Line group or Mobile phone.

5. **Course Objectives:**

5.1 Able to explain the theory and have skill of operation, adjustment, maintenance and practices in the field regarding machinery for soil preparation.

5.2 Able to explain the theory and have skill of operation, adjustment, maintenance and practices in the field regarding machinery for planting.

5.3 Able to explain the theory and have skill of operation, adjustment, maintenance and practices in the field regarding machinery for weed control.

5.4 Able to explain the theory and have skill of operation, adjustment, maintenance and practice in the field regarding machinery for fertilization.

5.5 Able to explain the theory and have skill of operation, adjustment, maintenance and practices in the field regarding machinery for spraying of agricultural chemicals.

6. **Description:**

Principles operation, repair maintenance and utilize application of farm machinery for tillage, planting, weed control, fertilizing and agricultural spraying.

7. Program Learning Outcomes: PLOs (8 PLOs of the 2022 AMM revised curriculum)

PLOs	Knowledge	Specific skills	Generic skills	Attitude
PLO3: Be able to summarize and discuss the results of the analysis critically or creatively in the field of agricultural machinery and technology	Explains the operational principles, maintenance of farm machinery for soil preparation, planting, weed control, fertilization and spraying of agricultural chemicals.	- Have skills in working, using and maintaining farm machinery for soil preparation, planting, weed control, fertilizing and spraying agricultural chemicals. -Can attach tools to tractors -Can use plowing machine to plow the soil correctly according to academic principles -Have skills in seeking additional knowledge	-Aware of tractor operation safety - Responsibility, discipline, diligent practice - Follow the movement of news and academic information related to the subject - Have a passion for the profession and the institution that you study.	-Be aware of operational safety -Have a passion for the farm machinery profession.
PLO6: Be able to choose information technology (IT) to operate tasks appropriately		-Have skills in using IT in agriculture.		- Value and love to seek knowledge in IT
PLO7: Be able to use Thai and English language on duty for listening, speaking, reading and writing appropriately.		- Use relevant technical terms correctly in both Thai and English - Write various reports that are assigned		
PLO8: Display a willingness to be responsible, disciplined, diligent, patient, and honest, human relations in working with others, be a good leader and follower and have a relationship with the organization.		-Be a good leader and follower -Have problem-solving skills	-Be responsible and disciplined in your work - Be diligent and patient - Be punctual - Be honest	-Love the profession and the institution that you study - Have good interpersonal skills in working with others

8. Course Learning Outcomes (CLOs) and Methods for measuring learning outcomes:

Course Learning Outcomes: CLOs	Learning outcome assessment	PLOs
CLO1: Able to explain the important components and operational principles of farm machinery for soil preparation, planting, weed control, fertilization and spraying of agricultural chemicals correctly according to academic principles.	1. Assessment of all chapter lectures and/or homework. 2. Submit all assigned assignments on time and complete all assignments.	PLO3 PLO6 PLO7

Course Learning Outcomes: CLOs	Learning outcome assessment	PLOs
CLO2: Have skills in operation, adjusting and maintaining farm machinery for soil preparation, planting, weed control, fertilizing and spraying agricultural chemicals in accordance with academic principles.	3. Evaluate practical skills using Marking Schemes and provide guidance during each practice. 4. Each practice exam, all students must pass a minimum of 60 percent (if not passed, must re-practice until passed). 5. Individual plowing practice with correctly according to academic principles was assessed and all students must pass a minimum of 60 percent. 6. Make a quality report of the work results by choosing the appropriate language and information technology (IT).	PLO3 PLO6 PLO7
CLO3: Students are responsible, moral, ethical, disciplined, punctual, honest, and responsible towards themselves and society.	7. Attend classes and be attentive to learning and practice and submit assigned work on time.	PLO8
CLO4: Have the skills to work with others as a good leader and member and can adapt to different situations appropriately.	8.Evaluate group work skills and provide advice on how to interact well in group work.	

9. Academic achievement measurement

9.1 Students must attend both lectures and practical classes for at least 80 percent of the total class time.

9.2 Assessment criteria and academic achievement measurement

Lecture Section	1. Examination of all chapter lectures	40%
	Frist exam (15%)	
	Secon exam (10%)	
	Third exam (15%)	
	2. Assignment	5%
	3. Submission of lecture notes/assigned documents	5%
Laboratory Section	1. Submit drawings of soil preparation tools (group assignment)	5%
	2. Individual plowing practice correctly according to academic principles (everyone must pass the exam)	15%
	3. Evaluate the laboratory work/research and make a laboratory report	20%
Interest in learning, determination to perform, responsibility and teamwork.		10%
	Total	100%

	>80	75-79	70-74	65-69	60-64	55-59	50-54	<50
Grade	A	B+	B	C+	C	D+	D	F

10. Documents to read:

12.1 Borpit Tangwongkit and Ratana Tangwongkit. 2010. Agricultural Machinery and Equipment. Kasesart University Press. Bangkok. 190 p.

12.2 Hunt.D., 1973. Farm Power and machinery managing. IOWA State University Press., Ames, IOWA. 313 PP.

12.3 Books, research reports, articles, and other relevant and up-to-date documents as assigned.

11. Evaluation of teaching results:

From the student's questionnaire, students must evaluate their teaching results at www.kps.ku.ac.th (go to Students, Teaching System) with the university's teaching evaluation form before the mid-term and final exams.

12. Review to improve teaching methods and teaching systems:

☑ **No review because students** were satisfied with the teaching in the previous session with a score of 4.47 and had 1 suggestion as "The study time is too short".

☐ Reviewed by reviewing from……

☐ Not revised……

☐ Revised to be consistent with…….

13. Teaching improvement from teaching evaluation results:

☐ **No teaching evaluation**

☑ **Teaching evaluation,**

☑ No improvement, "Manage teaching time more appropriately

☐ Improvements as follows……..

14. Schedule of activities related to teaching and learning (see Table 1)

Thursday: Lecture 10:00-12:00 Laboratory 13:00-16:00
at Seminar room AMM Building, Mechanical workshop and Field lab.

15. Criteria for individuals assess the soil preparation using a 3-disc plow correctly according to academic principles by using Rubrics show in Appendix 1.

Signature
(Assoc.Prof. Pongsak Chontanasawat)
18 June 2024

Table 1 Schedule of activities related to teaching and learning of the 02027262 Fundamental of Agricultural Control System

No.	Lesson	LLOS	Learning Level	Teaching/Learning method	Assessment	Instructor	CLOs	PLO
1	**Lesson 1: Tillage Machine** 1.1 Importance of soil preparation 1.2 Tillage System 1.3 Land preparation before plowing.	1.1 Able to explain the importance of soil preparation for planting. 1.2 Able to explain the Tillage System 1.3 Able to explain the methods of preparing the area before plowing. 1.4 Draw a diagram of the soil preparation tools that are assigned.	K: An S: Precision A: Valuing	**--Explain the learning outcomes (CLOs),** teaching methods, assessment, and measurement of learning outcomes through the Course Syllabus, and there are comments and agreements between teachers and students. **-The Course Syllabus is uploaded** on Ed-Farm for students to print out and bring to class every time. **1) Lecture section** using media, slides, video clips and discussion, Q&A - The importance of soil preparation - Tillage System - Land preparation before plowing and harrowing, including land leveling, subsoil breaking. **2) Laboratory section** - Divide students into small groups for demonstration on plowing and harrowing equipment which students understand in detail of important components, usage, adjustment points and maintenance. Ask questions and discussion activities were used until students achieved LLOs and CLOs. - Then rotate group learning until all groups of equipment are complete. -Each group of students randomly selects 1 piece of equipment and applies the knowledge from subject 02027212 to write a Mechanical Drawing of the randomly selected tool (group work).	**1) Lecture section:** - Submit the learning recording report this time on Ed-Farm before next week's class - Take the lecture exam when completing Chapter 1 in the 5th class. **2) Laboratory section:** -Assess students' operational skills during the operation -Submit the laboratory report of this class on Ed-Farm before next week's class -Submit the Drawing of the assigned tools to Ed-Farm by July 23, 2024.	Pongsak Vitawas Ratana	CLO1 CLO2 CLO3 CLO4	PLO3 PLO6 PLO7 PLO8
2	**Lesson 1: Tillage Machine** 1.4 Soil preparation type 1.5 Plowing equipment 1.6 Harrowing equipment	1.5 Describe the types of soil preparation for planting crops. 1.6 Describe the plowing and Harrowing equipment mounted to a walking tractor and tractor. 1.7 Describe the operation, adjustment, use, and maintenance of plowing and Harrowing equipment. 1.8 Can measure various important dimensions of plowing and Harrowing		**1) Lecture section** using media, slides, video clips and discussion, questions, and answers - Types of soil preparation - Plowing and harrowing equipment mounted on walking tractors and tractors - Operation, setting up, using and maintaining plowing equipment. - Operation, setting up, using and maintaining harrowing equipment. **2) Laboratory section** -Divide students into 4 groups according to the number of plowing and harrowing equipment available for practice on plowing and harrowing equipment which students understand in detail of following	**1) Lecture section:** - Submit the learning recording report this time on Ed-Farm before next week's class - Take the lecture exam when completing Chapter 1 in the 5th class. **2) Laboratory section:** -Assess students' operational skills during the operation -Submit the laboratory report of this class on Ed-Farm before next week's class	Vitawas Chuti Thawatchi		

No.	Lesson	LLOS	Learning Level	Teaching/Learning method	Assessment	Instructor	CLOs	PLO
		equipment. 1.9 Can use, adjust, and maintain plowing and harrowing tools.		- Measure the Dimension and Weight of the tools - Measure the working width - Measure the disc angle, tilt angle of the disc plow and lead angle - Measure the Vertical & Horizontal suction angle of the moldboard plow - type of attachment to the tractor - Adjustment for use - Maintenance - Then rotate group learning until all groups of equipment are complete.				
3	**Lesson 1: Tillage Machine** 1.7 Proper plowing and harrowing of soil according to academic principles	1.10 Explain the correct plowing and harrowing techniques. 1.11 Be able to use, adjust, and maintain plowing and harrowing equipment. 1.12 Be able to use a disc plow to plow the soil in the plot in accordance with academic principles.		**1) Lecture section** using media, slides, video clips and discussion, questions, and answers on topics - Proper plowing according to academic principles, furrows opening (2 types of furrows opening method as Single spite and Double spite), method of plowing and closing plow-work. - Proper harrowing method according to academic principles **2) Laboratory section** - Demonstrate the correct plowing and harrowing steps according to academic principles - All students are trained in plowing and harrowing according to academic principles under the supervision of the teaching team. - All students sign the overtime training request until they can control the tools and achieve good plowing and harrowing results, then they request to assess through CLO.	**1) Lecture section:** - Submit the learning recording report this time on Ed-Farm before next week's class - Take the lecture exam when completing Chapter 1 in the 5th class. **2) Laboratory section:** -Assess students' operational skills during the operation -Submit the laboratory report of this class on Ed-Farm before next week's class - **Individuals assess the soil preparation using a 3-disc plow correctly according to academic principles by <u>using Rubrics criteria</u>, by 22 September 2023.** **Note:** *Students must use their free time to practice until they are good at it, then they can take the test.*	Vitawas Chuti Thawatchi		
4	**Lesson 1: Tillage Machine** 1.8 Equipment for soil preparation of rice fields (Wet land)	1.13 Explain the use, adjustment, and maintenance equipment for soil preparation for wet rice cultivation.		**1) Lecture section** using media, slides, video clips and discussion, questions, and answers on topics of equipment for soil preparation of rice fields (Wet land). **2) Laboratory section**	**1) Lecture section:** - Submit the learning recording report this time on Ed-Farm before next week's	Vitawas Chuti Thawatchi		

No.	Lesson	LLOS	Learning Level	Teaching/Learning method	Assessment	Instructor	CLOs	PLO
		1.14 Be able to operate, adjust and maintain equipment for preparing soil for rice fields.		- Explain and demonstrate the training of using, adjusting, and maintaining soil preparation equipment for Wetland rice fields (tools attached to the back of walking tractors and tractors) - All students are trained in the use, adjustment, and maintenance of soil preparation equipment for wet land rice fields under the supervision of the teaching team (equipment attached to the back of a walking tractor and tractor).	class - Take the lecture exam when completing Chapter 1 in the 5th class. **2) Laboratory section:** -Assess students' operational skills during the operation -Submit the laboratory report of this class on Ed-Farm before next week's class.			
5	**The 1st Lecture Examination: Tillage Machine**							
6	**Lesson 2: Planting Machine** 2.1 Importance and principles of planting plants using agricultural machinery 2.2 Seed germination rate Calculation	2.1 Able to explain the importance and principles of crops planting using agricultural machinery. 2.2 Be able to calculate seed germination rate, breakage rate and usage rate. 2.3 Be able to use, adjust and maintain various types of planting machines.	K: An S: Precision A: Valuing	**1) Lecture section** using media, slides, video clips and discussion, questions, and answers on topics of - importance and principles of crops planting using agricultural machinery. - Seed germination rate, breakage rate and usage rate calculation. **2) Laboratory section** 2.1) Measuring seed shape, dimension, no. of seeds/kg, moisture, seed bulk density 2.2) Cultivating sample seeds to calculate: - Seed germination rate before using the planter - Seed breakage rate after passing through the Seed metering device (Comparison between the Chainat 2 planter and the air suction planter) - Seed utilization rate from the number of germinated plants after using the planter	**1) Lecture section:** - Submit the learning recording report this time on Ed-Farm before next week's class - Take the lecture exam when completing Chapter 2 in the 9th class. **2) Laboratory section:** -Assess students' operational skills during the operation -Submit the laboratory report of this class on Ed-Farm before next week's class	Vitawas Chuti Thawatchi		
7	**Lesson 2: Planting Machine** 2.3 Types and important components of crop planters 2.4 Operation/adjustment and maintenance	2.4 Describe the types, components, operating principles/adjustment, and maintenance of grain planters. 2.5 Be able to operate, adjust and maintain grain planters.		**1) Lecture section** using media, slides, video clips and discussion, questions, and answers on topics of - Types of crop planters - Operation/adjustment and maintenance **2) Laboratory section** 2.1) Operation of crop planting machines attached to the back of walking tractors and tractors by dividing students into 7 subgroups according to the number of planting machines available, namely: 1) push-type planting tools 2) towed-type planting tools 3) sowing machines 4) Inclined plate seeder 5) Chainat 2 6) 5-row air suction planter 7) Rice seed sowing machine which topic for study of each group are important components, adjusting the planting rate,				

No.	Lesson	LLOS	Learning Level	Teaching/Learning method	Assessment	Instructor	CLOs	PLO
				operation, and maintenance. - Then rotate group learning until all groups of equipment are complete. 2.2) All students practice planting crops using the assigned planting equipment (however, students must prepare the planting area before conducting the experiment).				
8	**Lesson 2: Planting Machine** 2.5 Special planting machines include sugarcane bud planter, sugarcane stalk planter, vegetable planter, cassava planter, potato planter, rice transplanter, etc.	2.6 Describe components, operating principles, adjustment, and maintenance of special planting equipment. 2.7 Be able to use, operate, adjust and maintain special planting equipment.		**1) Lecture section** using media, slides, video clips and discussion, questions, and answers on topics of components, operation, adjustment, and maintenance of special planting machines, such as sugarcane bud planter, vegetable planter, cassava planter, potato planter, rice transplanter, etc. **2) Laboratory section** 2.1) Divide students into 4 subgroups. Practice special planting machines, including sugarcane bud planter, sugarcane stalk planter, cassava planter, and rice transplanter which topic for study of each group are important components, adjusting the planting rate, operation, and maintenance. - Then rotate group learning until all groups of equipment are complete. 2.2) All students practice planting using the assigned planting equipment				
9	**The 2nd Lecture Examination: Planting Machine**							
10-11	**Lesson 3: Plant Cultivation Machine** 3.1 Importance, types, principles, operation, components, adjustment, and maintenance of weed control equipment.	3.1 Able to explain the importance, types, principles, operation, components, adjustment and maintenance of weed control equipment. 3.2 Be able to use, operate, adjust and maintain weeding tools.	K: An S: Precision A: Valuing	1**) Lecture section** using media, slides, video clips and discussion, Q&A - Importance, types, principles, operation, important components, adjustment, and maintenance of weed control equipment. **2) Laboratory section** 2.1) Divide students into 4 small groups. Practical each tool is as follows: 1) Rotary hoe 2) Cutaway 3) Multipurpose harrow 4) Spring rake which topic for study of each group are: - Key components of weeding tools - Setting and calculating weeding rates - Weeding tool maintenance - Then rotate group learning until all groups of equipment are complete. 2.2) All students practice using, operating, adjusting and maintaining weed control equipment.	**1) Lecture section:** - Submit the learning recording report this time on Ed-Farm before next week's class - Take the lecture exam when completing Chapter 3 in the 14th class. **2) Laboratory section:** -Assess students' operational skills during the operation -Submit the laboratory report of this class on Ed-Farm before next week's class	Sombat Nonthawat		
12-13	**Lesson 3: Plant Cultivation Machine**	3.3 Able to explain the importance, types, principles, operation,		1**) Lecture section** using media, slides, video clips and discussion, Q&A - Importance, types, principles, operation, important	**1) Lecture section:** - Submit the learning			

No.	Lesson	LLOS	Learning Level	Teaching/Learning method	Assessment	Instructor	CLOs	PLO
	Importance, types, principles and operation, components, adjustment and maintenance of fertilizer applicators.	important components, adjustment, and maintenance of fertilizer applicators. 3.4 Be able to use, operate, adjust and maintain fertilizer applicators.		components, adjustment, and maintenance of fertilizer applicators. **2) Laboratory section** 2.1) Divide students into 5 subgroups to practice fertilizer application machines: 1) Chemical fertilizer spreader 2) Manure spreader 3) Fertilizer spreader 4) Fertilizer dropper 5) Fertilizer sprayer which topic for study of each group is: - Important components of a fertilizer applicator - Adjusting and calculating the fertilizer application rate - Maintaining the fertilizer applicator - Then rotate group learning until all groups of equipment are complete. 2.2) All students practice using, operating, adjusting and maintaining fertilizer applicator.	recording report this time on Ed-Farm before next week's class - Take the lecture exam when completing Chapter 3 in the 14th class. **2) Laboratory section:** -Assess students' operational skills during the operation -Submit the laboratory report of this class on Ed-Farm before next week's class			
14	**Lesson 3: Plant Cultivation Machine** 3.3 Importance, types, principles and operation, important components, adjustment and maintenance of sprayers.	3.5 Able to explain the importance, types, principles, operation, important components, adjustment, and maintenance of the sprayer. 3.6 Be able to use, operate, adjust and maintain the sprayer.		1**) Lecture section** using media, slides, video clips and discussion, Q&A - Importance, types, principles, operation, important components, adjustment, and maintenance of sprayers. **2) Laboratory section** Divide students into 3 subgroups to practice plant care tools: 1) Backpack sprayer 2) Tractor-mounted sprayer 3) Spraying equipment/heads which topic for study of each group is. - Important components of the sprayer - Adjustment and calculation of spray rate - Maintenance of the sprayer -Then rotate group learning until all groups of equipment are complete. 2.2) All students practice using, operating, adjusting, and maintaining fertilizer applicators.	**1) Lecture section:** - Submit the learning recording report this time on Ed-Farm before next week's class - Take the lecture exam when completing Chapter 3 in the 12th class. **2) Laboratory section:** -Assess students' operational skills during the operation -Submit the laboratory report of this class on Ed-Farm before next week's class			
15	**The 3rd Lecture Examination: Cultivation Machine**							

Appendix 1

Criteria for individuals assess the soil preparation using a 3-disc plow correctly according to academic principles by using Rubric criteria.

Course 02027322: Principle of Farm Machinery II

Topic	Agricultural Tractor	Assessment Items	Note
1	**New Holland TT3.50**	**Double Split Plowing Method**	- Use main gear 3, sub-gear L, with the engine speed at 1200 RPM for range 1-6." - Use main gear 3, sub-gear L, with the engine speed at 1200 RPM for range 7-14."

1. Assessment Criteria for the Practical Tractor Driving Test: Double Split Field Opening Plowing Method

Topic		Scoring Criteria			Score	Note Examination Prohibitions
		5	3	1		
1	Adjusting the Implement for Plow Alignment 1-6 (See Table 1)	The first plow disc does not cut into the soil, while the third plow disc cuts into the soil. The rear wheel of the implement is approximately 20 cm above ground when the equipment is lifted.	The first plow disc engages the soil, or the third plow disc fails to engage the soil, or the rear gauge wheel is approximately 10 cm above the ground when the equipment is lifted	The first plow disc engages the soil, while the third plow disc does not engage the soil, and the rear gauge wheel is approximately 10 cm above the ground when the equipment is lifted.	5	Engaged in the wrong gear, failed to start the tractor, did not press the clutch, performed the steps incorrectly, and adjusted the implement improperly.
2	Plowing Pattern (See Table 2)	Plowed correctly according to the pattern in all rows.	Plowed correctly according to the pattern in more than 12 rows.	Plowed correctly according to the pattern in more than 6 rows	5	Performed the plowing procedure incorrectly in more than 5 rows.
3	Adjusting the implement for plowing rows 7-14 (See Table 1)	Adjust the implement so that every plow disc engages the soil evenly.	Adjusted the implement, but the plow discs do not engage the soil evenly.	Did not adjust the implement, and the plow discs do not engage the soil evenly.	5	The plow disc does not engage the soil.
4	Vehicle control (See Table 3)	Drive with the left hand, use the right hand to control the implement, and change gears no more than once.	Drive with both hands or fail to use the right hand to hold the control lever or change gears more than once.	Drive with both hands throughout, and the right hand does not hold the control lever and change gears more than once.	5	Turn without lifting the implement
5	Control of the implement (See Table 4)	Set the position control lever and automatic control lever correctly in all rows and use the Lift-O-Matic to control the implement.	Set the position control lever incorrectly or set the automatic control lever incorrectly or fail to use the Lift-O-Matic to control the implement.	Set the position control lever incorrectly and the automatic control lever incorrectly or fail to use the Lift-O-Matic to control the implement.	5	Turn without lifting the implement.
6	Duration	<=15 minutes	>15-18 minutes	>18-22 minutes	5	More than 22 minutes
				Total	30	

Examination Requirements:

1. Students entering the examination must wear the official practical or field uniform in accordance with regulations to be eligible for the practical skills assessment.
2. Students who receive a score of 1 point in three or more assessment criteria will be considered to have failed the practical skills assessment. A retake is required, and a minimum score of 60 percent must be achieved to pass the assessment.
3. Students who violate any of the prohibited actions during the examination will be required to retake the exam and will incur a deduction of 5 points from the total score on each retake.
4. Students must follow the operational procedures shown in Image 1 and the step-by-step guide in Tables 1-4.

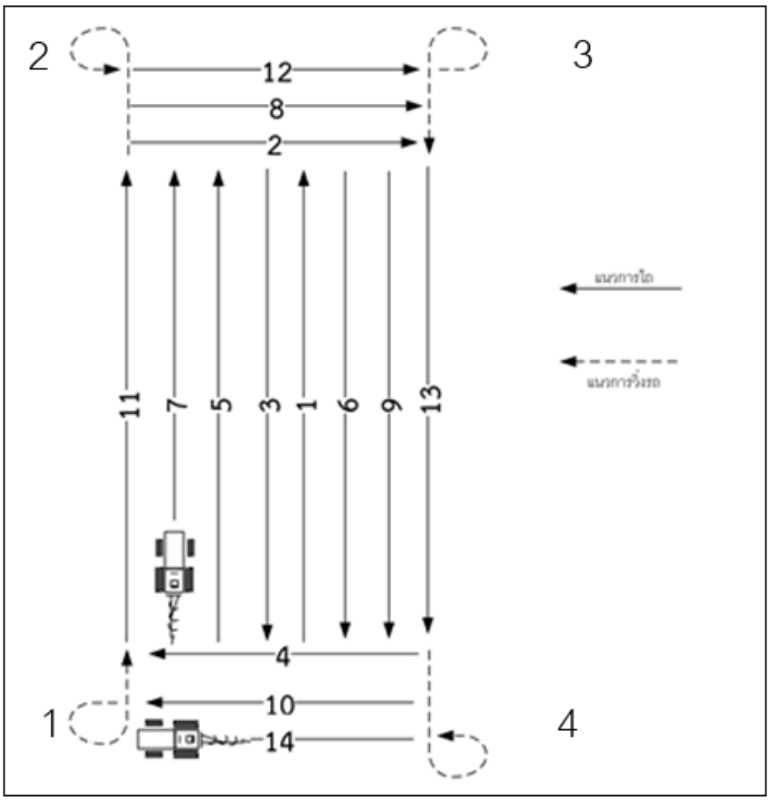

Figure 1 Recommended Operational Procedures

Recommended Operational Steps 1-4 of the soil preparation using a 3-disc plow correctly according to academic principles.

Step I: Steps and Methods for Adjusting the Implement	
Plowing line	**Adjustment**
1-6	1. In rows 1-6, adjust the first disc (the disc closest to the tractor wheel) so that it does not engage the soil. The second disc should engage the soil about halfway, and the third disc (closest to the rear gauge wheel) should engage the soil by about one full disc. This adjustment should be made using the middle arm by extending the middle arm out and retracting the right drag arm as far as possible. 2. Check by fully lifting the implement, ensuring that the rear gauge wheel is approximately 20 cm above the ground. This measurement should be taken from the center of the rear gauge wheel hub.
7-14	1. Before reaching row 7, adjust the first disc (the disc closest to the tractor wheel), the second disc, and the third disc (closest to the rear gauge wheel) to engage the soil by about one full disc. This adjustment should be made using the middle arm by retracting the middle arm inward. 2. Check by lowering the implement fully, ensuring that the first disc (the disc closest to the tractor wheel) is approximately 15 cm above the ground, or just enough for a palm to pass underneath.

Step II: Plowing Pattern	
Plowing line	**Operational Steps**
1	Open the plowing furrow along the centerline of the field.
2	Perform the first field cutting by positioning the tractor's right-hand wheel and the first wheel into furrow 1. Then, lower the implement and plow until the rear gauge wheel is about one tractor length beyond furrow 1.
3	Plow back along the centerline, ensuring that the tractor's left-hand wheel (driver's side) runs almost at the edge of furrow 1, without going too high to avoid stepping over the furrow ridge.
4	Perform the second field cutting by positioning the tractor's right-hand wheel (driver's side) and the first wheel into furrow 1. Then, lower the implement and plow until the rear gauge wheel is about one tractor length beyond furrow 3, at which point the implement should be raised.
5	Plow back along the line of furrow 3, ensuring that both the tractor's right-hand wheels (driver's side) are positioned into furrow 3. Lower the implement when the rear wheels are in the furrow (furrow 4), and raise the implement when the rear wheels pass over the furrow where the first pass was made (furrow 2).
6	Plow back along the line of furrow 1, ensuring that both of the tractor's right-hand wheels (driver's side) are positioned into furrow 1. Lower the implement when the rear wheels enter the furrow created during the first pass (furrow 2), and raise the implement once the rear wheels pass over the furrow where the field cutting started (furrow 4)
7	**1.** Before entering furrow 7, adjust the implement so that the first disc (the disc closest to the tractor wheel) engages the soil, the second disc, and the third disc (closest to the rear gauge wheel) engage the soil by about one full disc. Adjust the middle arm by retracting it inward. Check by lowering the implement fully, ensuring that the first disc (the disc closest to the tractor wheel) is approximately 15 cm above the ground, or just enough for a palm to pass underneath **2.** Enter the furrow by plowing along the line of furrow 5. Ensure that both of the tractor's right-hand wheels (driver's side) are positioned into furrow 5. Lower the implement when the rear wheels enter the furrow created during the previous pass (furrow 4), and raise the implement once the rear wheels pass over the furrow where the first pass began (furrow 2). Perform the initial field cutting by positioning the tractor's right-hand wheels into furrow 2, with the rear right wheel aligned in furrow 7. Lower the implement and plow until the rear gauge wheel is approximately one tractor length beyond furrow 6
8	Perform the initial field cutting by positioning the tractor's right-hand wheel (driver's side) into furrow 2, and ensuring that the rear right wheel is aligned with furrow 7 from the previous pass. Lower the implement and plow until the rear gauge wheel moves approximately one full tractor length beyond furrow 6.
9	Plow back along the line of furrow 6, ensuring that both of the tractor's right-hand wheels (driver's side) are positioned into furrow 6. Lower the implement when the rear wheels enter the furrow created during the previous pass (furrow 8), and raise the implement once the rear wheels pass over the furrow where the initial field cutting began (furrow 4).

10	Perform the initial field cutting by positioning the tractor's right-hand wheel (driver's side) into furrow 4, and ensuring that the rear right wheel is aligned with furrow 9 from the previous pass. Lower the implement and plow until the rear gauge wheel moves approximately one full tractor length beyond furrow 7. Then, turn the tractor to the left to enter furrow 11 (turn in the shape of the first cross).
11	Plow back along the line of furrow 7, ensuring that both of the tractor's right-hand wheels (driver's side) are positioned into furrow 7. Lower the implement when the rear wheels enter the furrow created during the previous pass (furrow 10), and raise the implement once the rear wheels pass over the furrow where the initial field cutting began (furrow 8). Afterward, turn the tractor to the left to enter furrow 12 (turn in the shape of the second cross).
12	Perform the initial field cutting by positioning the tractor's right-hand wheel (driver's side) into furrow 8, and ensuring that the rear right wheel is aligned with furrow 11 from the previous pass. Lower the implement and plow until the rear gauge wheel moves approximately one full tractor length beyond furrow 9. Afterward, turn the tractor to the left to enter furrow 13 (turn in the shape of the third cross).
13	Plow back along the line of furrow 9, ensuring that both of the tractor's right-hand wheels (driver's side) are positioned into furrow 9. Lower the implement when the rear wheels enter the furrow created during the previous pass (furrow 12), and raise the implement once the rear wheels pass over the furrow where the initial field cutting began (furrow 10). Afterward, turn the tractor to the left to enter furrow 14 (turn in the shape of the fourth cross).
14	Perform the initial field cutting by positioning the tractor's right-hand wheel (driver's side) into furrow 10, and ensuring that the rear right wheel is aligned with furrow 13 from the previous pass. Lower the implement and plow until the rear gauge wheel moves approximately one full tractor length beyond furrow 11. Afterward, turn the tractor and park it at the starting point. Check the gear lever is in neutral, engage the handbrake, turn off the engine, and remove the key. Stop the timer and conclude the examination.

Step III: Steps and Methods for Operating the Tractor

Plowing line	Operational Steps
All plowing rows	1. Operate the tractor using only the forward and reverse gears. Gear changes should be limited to only one shift between forward and reverse for each furrow. The tractor must be turned to align with the furrow, without exceeding the prescribed number of gear shifts 2. Steer the tractor with only the left hand on the steering wheel, while using the right hand to control the implement.

Step IV: Steps and Methods for Operating the Implement

Plowing line	Operational Steps
All plowing rows	1. Control the implement using the automatic control switch. Set the Draft control lever (red lever) between numbers 5-7, and set the implement control lever (yellow lever) with the top of the lever at 13.5 in the range of furrows 1-6. In the range of furrows 7-14, set the implement control lever (yellow lever) with the bottom of the lever at 13.5. 2. Control the implement's lifting and lowering correctly according to the pattern specified in Table 2 (Plowing Pattern).