Course Syllabus
Frist Semester, Academic Year 2024

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

2. **Course code: 02027261** **Course name:** Electric and Electronics for Agriculture
   Credit: 3(2-3-6)
   Pre: **-**

3. **Instructor team:**
   Mr. Pavit Tangwongkit E-mail : ptangwongkit@gmail.com

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. Objectives:

5.1 Students can explain the basic principles of electricity and power systems
5.2 Students can analyze basic electrical circuits, design and control electrical equipment in agriculture.
5.3 Students can explain basic electronic principles, basic electronic circuit analysis, basic digital principles, digital circuits and design.
5.4 Students can use electrical and electronic tools in agriculture.
5.5 Students can explain the principles of solar cells and their applications.

6. Course Description

Basic principle of electric and power electrical system, basic electrical circuit analysis, design and control of electrical equipment in agriculture, electronics circuit analysis, basic power electronics, basic principle of digital, digital circuit and design, applied electrical and electronics equipment in agriculture.

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

LOs	Knowledge	Specific skills	Generic skills	Attitude
PLO5: Be able to examine an electrical circuit, electronic circuit, and mechatronics principles to control an agricultural work properly	-Electrical principles and their applications -Electronic principles and their applications -Solar cell principles and their applications -Equipment and tools used in electrical work	- Able to draw electrical circuits in homes and in agriculture - Able to draw solar cell circuits in agriculture - Skilled in operating electrical systems in agriculture -Skills in operating electronics in agriculture -Skills in operating solar cells in agriculture -Applying and selecting electrical equipment in daily life	- Can use technical terms (English) - Have skills in working with others	- Taking care of yourself and others' safety - Punctuality - Keeping up with relevant academic news and information

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

Course Learning Outcomes: CLOs	วิธีการวัดผลการเรียนรู้	PLOs
CLO1: Know electrical equipment, explain electrical circuits in homes, electric motor control circuits, electronic circuits, and the use of solar cells in agriculture.	1. Complete the lecture and/or end-of-chapter homework for each chapter, using appropriate language (PLO7) and information technology (IT) (PLO6). 2. Submit assigned assignments on time and complete all tasks by using appropriate language (PLO7) and information technology (IT) (PLO6).	PLO5 PLO6 PLO7
CLO2: Assemble and fix home electrical system circuits, electric motor control circuits, electronic circuits, and agricultural solar cell circuits.	3. Evaluate practical skills during every practice. 4. Examine each practice, with all students having to pass a minimum of 60 percent (if they fail, they must re-do until they pass). 5. Report every time an operation is performed, using appropriate language (PLO7) and information technology (IT) (PLO6) to produce quality reports.	PLO5 PLO6 PLO7
CLO3: Display a responsible, moral, ethical, disciplined, punctual, honest, and responsible.	6. 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 various situations appropriately. towards themselves and society.	7.Evaluate group work skills and provide advice on how to interact well in group work.	PLO8

9. Academic achievement measurement

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

9.2 Assessment criteria and academic achievement measurement

1. Lecture section:	Lecture exam and/or homework at the end of each lesson	30%
2. Laboratory section	-Assess practical skills using Marking Schemes and provide guidance during the workshop	20%
	-Test each workshop, all students must pass a minimum of 60%	25%
3. Research/work report/submission of notebooks/lecture study		15%
4. Interest in learning, determination to perform, responsibility and teamwork.		10%
	Total	**100%**

Score level	>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:

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

☑ **Reviewed by reviewing from** Student evaluation results and examination results ☐ Not revised……

☐ Revised to be consistent with…….

13.Teaching improvement from teaching evaluation results:

☐ No teaching evaluation

☑ **Teaching evaluation,** the average score of the previous evaluation is equal to 4.68.

☐ No improvement, ……

☑ **Improvements as follows**… The results of student evaluation and the results of the review include there should be a method for students to evaluate teaching in the system more, as only 14 out of 33 students (42.42%) evaluated in the system, with no suggestions for improving teaching methods and the teaching system. Therefore, suggestions for consideration for improvement are unknown.

14.Teaching improvement from teaching evaluation results:

☐ No teaching evaluation

☑ **Teaching evaluation,** The average score of the previous evaluation was 4.53 (from 14 out of 33 students (42.42%) who evaluated in the system, with no suggestions for improving teaching.

☐ No improvement, ……

☑ **Improvements as follows**… There are more ways for students to evaluate teaching in the system to get feedback on improving teaching in this semester

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

Tuesday Lecture 10:00-12:00 Laboratory 13:00-16:00 at Phulprasert Pipa-anan Building.

Signature 

(Mr. Pavit Tangwongkit)

18 June 2024

Table 1 Schedule of activities related to teaching and learning of the 02027261 Electric and Electronics for Agriculture

Tuesday Lecture 10:00-12:00 Laboratory 13:00-16:00 at Phulprasert Pipa-anan Building.

No.	Lessons	LLOs	L-Level	Teaching/Learning method	Assessment	Instructor	CLOs	PLOs
1	Lesson1: Basic Electrical Principles	- Explain the relationship between different electrical measurement units such as voltage, current, and resistance. - Explain the differences and importance of DC and AC electricity. - Explain the differences between different types of wires. - Be able to connect wires and use wiring equipment.	K: Ap S: Manipulation A: Responding	**Clarify and agree on details of learning outcomes (LLOs and CLOs),** teaching methods, assessment and measurement of learning outcomes through Course Syllabus uploaded on Edu-Farm and teaching materials uploaded on Edu-Farm. **Lecture/Discussion/Question** - Basic Electrical Knowledge, Basic Electrical Calculations - Differences and Importance between DC and AC **Laboratory:** -Demonstrate and let students follow along. When students understand, let students practice by themselves (individually) under the supervision of the teacher and teaching assistant. - Connecting solid wires THW (connecting 2-wire twisted wires, 3-wire twisted wires, T-shaped) and wrapping with electrical tape -VFF Flexible Wire Connection (Connecting Wires to a Single Line) -Using a soldering iron to solder the VFF wires with lead and insulate with heat shrink tube insulation.	**Lecture:** - Lecture exam at the end of each lesson - Attendance and attention **Laboratory:** - Evaluate practical skills, both individual and group work, under the guidance of the instructor/teaching assistant during the practice - Each practical examination, all students must pass a minimum of 60 percent (if not passed, must retake the practice until passed) - Evaluate the work/report of the quality of the work by selecting appropriate language and information technology (IT). Attend classes and submit assignments on time.	Pavit	CLO1 CLO2 CLO3 CLO4	PLO5 PLO6 PLO7 PLO8
2	Lesson2: Basic Home Electricity	- Explain the differences and importance of connecting series and parallel circuits - Calculate various electrical estimates when connecting different circuits - Can connect plugs and outdoor lights		**Lecture/Discussion/Question** - Various types of electrical circuit connections, such as series and parallel connections - Various methods of electrical calculations when connecting various types of circuits **Laboratory:** Demonstrate and let students follow along. When students understand, let students practice by themselves (individually) under the supervision of teachers and teaching assistants. • Connecting the field extension cord • Connecting the field light bulbs				
3	Lesson3: Home Electrical	- Describe electrical circuits used in homes - Describe the		**Lecture/Discussion/Question** - Basic home electrical circuits - Working principles of various electrical safety				

	Systems	functions and basic operating principles of electrical safety devices such as breakers, surge protectors, and grounding wires - Be able to connect electrical circuits in homes		devices **Laboratory:** Demonstrate and let students follow along. When students understand, let students practice by themselves (individually) under the supervision of teachers and teaching assistants. • Connecting electrical circuits in the home (sockets and light bulbs) • Connecting electrical circuits in the home (stair switches)				
4	Lesson4: Home Electrical Devices	- Calculate the power of electrical equipment - Can read the labels of household electrical appliances		**Lecture/Discussion/Question** - Relationship between various electrical estimates and electrical power - How to read labels of electrical appliances in the home **Laboratory:** -Go to study and observe various electrical equipment available on the market.				
5	Lesson5 Provincial Electricity Authority Services	- Explain the power transmission system - Calculate the electricity cost from the electrical unit		**Lecture/Discussion/Question** - Power transmission and distribution systems from power generation to electricity users - Calculation of electrical units and calculation of electricity bills **Laboratory:** - Invited speakers from the Provincial Electricity Authority (PEA) to give a lecture on general knowledge about electricity usage, electricity bill calculation, precautions and prevention of electrical accidents.		Invited speakers from the Provincial Electricity Authority (PEA)		
6 - 8	Lesson6: Electric Motor Control System	- Explain the components of various types of electric motors - Explain the working principles of various types of motors - Explain the circuits used to control various types of motors.		**Lecture/Discussion/Question** - Components of various electric motors - Basic working principles of various electric motors - Principles of circuits used to control various motors **Laboratory:** -Demonstrate and let students follow along. When students understand, let students practice by themselves under the supervision of the teacher and teaching assistant. - 3-phase motor control circuits include: 1) Direct start circuit, 2) Reversing after stop		Pavit		

		- Can connect the electric motor control system.		circuit, and 3) Plugging circuit.				
9-11	Lesson7: Basic Electricity	- Explain the working principles of various devices in electronic circuits - Explain the functions of various electronic circuits - Explain the working principles of electrical measurement devices		**Lecture/Discussion/Question** - Principles of operation of various devices in electronic circuits - Functions of various electronic circuits - Principles of use of electrical measurement devices **Laboratory:** - Using a digital and needle multimeter - Assemble basic electronic circuits according to the specified model				
12-13	Lesson8: Basic Car Electricity	- Describe the electrical system used in cars		**Lecture/Discussion/Question** - Electrical systems used in automobiles - Components of electrical systems in automobiles **Laboratory:** -Demonstrate and let students follow along. When students understand, let them practice by themselves under the supervision of the teacher and teaching assistant. - Components and electrical systems in automobiles				
14-15	Lesson9: Solar Cells for Agriculture	- Describe the components of the electrical system in cars		**Lecture/Discussion/Question** - Components of solar cell circuit - Differences of each solar cell system such as On-Grid, Hybrid and Off-Grid **Laboratory:** Demonstrate and have students follow along. When students understand, have them practice by themselves under the supervision of the teacher and teaching assistant. - Solar cell components and circuits				