Course Syllabus
First Semester, Academic Year 2024

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

2. Course code: 02027461   Course name: Agricultural
   Credit: 3(2-3-6)   Mechatronics I
   Pre: 02027262

3. Instructor team:

   Mr. Pavit Tangwongkit   E-mail : ptangwongkit@gmail.com
   Asst.Prof.Surasak Phoemsapthawee E-mail : surasak.pho@ku.th
   Dr.Chalvalit Khanakornsuksan   E-mail : chawalit.kh@ku.ac.th

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

5. Course Objectives:
   5.1 Able to explain the architecture of microcontroller boards.
   5.2 Able to explain the steps of program development, principles of writing computer programming languages for microcontroller boards.
   5.3 Able to sequence the steps of processing, checking and fixing errors in the program
   5.4 Able to write a program to command the microcontroller board to read values from the sensor and control the actuator.

6. Course Description:

   Embedded system architecture, instruments and tools for development of embedded system, fundamental principles for development of embedded system, application of embedded system on agricultural mechatronics.

7. Program Learning Outcomes: PLOs (7PLOs of the 2017 AMM revised curriculum)

PLOs	Knowledge	Specific skills	Generic skills	Attitude
PLO4: Be able to search pursue academic progress and integrate knowledge of agricultural machinery and technology in agriculture.	- Microcontroller board architecture - Principles and steps of developing computer programming language programs for microcontroller boards - Processing steps, checking and debugging programs -Write a program to	- Programing skill to control the microcontroller board to read values from the sensor and control the actuator. - Have skills in summarizing and discussing the results of the analysis - Have systematic thinking skills -Have skills in working and solving problems that occur -Have skills in communication and presenting work	- Follow the movement of news and information on agricultural academics related to the subject - Have a passion for the profession and the institution that you study. -Technical academic vocabulary (in	- Be responsible - Punctuality - Honesty. - Ability to work collaboratively with others. - Develop a passion for the profession - Has a passion for the profession - Keeping up with relevant academic

	command the microcontroller board to read values from the sensor and control the actuator. -Application of microcontrollers with high-level language in agricultural mechatronics.	-Able to apply computer programs and IT	English) in the field of agricultural machinery and technology -Computer and IT skills in agriculture.	news and information.
PLO5: Be shown to morality, ethics, discipline, punctuality, honesty, responsibility towards oneself and society.	- University regulations for higher education of Kasetsart University	Able to appropriately adjust behavior during internship training. Possesses a positive attitude toward oneself, others, and society.	- Behave appropriately and serve as a good role model - Comply with university regulations and refrain from misconduct - Participate in various activities with intention and willingness	- Be responsible - Punctuality - Honesty. - Ability to work collaboratively with others. - Develop a passion for the profession
PLO6: Be able to communicate their knowledge of agricultural machinery and technology which is appropriate to both in the academic section and the agricultural community.	-Presentation techniques in both writing and oral delivery. -Able to use technical terminology in both Thai and English.	- Able to present academic progress in agricultural machinery. - Able to use academic terminology (in Thai and English) related to agricultural machinery and technology. - Able to explain agricultural machinery and technology knowledge to local communities.	- Confidence in presentation - Safety in work practices	
PLO7: Be able to work with others as good leaders and members, and able to adapt to different situations appropriately.		- Interpersonal skills for working with others and the ability to work effectively as part of a team. - Leadership and followership skills, with a willingness to listen to colleagues' opinions. - Problem-solving skills in various situations.	- Possess presentation skills and the ability to listen to colleagues' opinions	- Has a positive attitude toward living and working with others. - Adapts appropriately to different environments.

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

Course Learning Outcomes: CLOs	Methods for measuring learning outcomes	PLOs
CLO1: Be able to explain the architecture of embedded systems. CLO2: Be able to integrate various extension devices with embedded systems. CLO3: Able to apply embedded systems to solve agricultural problems systematically CLO4: Able to create a prototype to solve agricultural problems with embedded systems	1. Assess individual knowledge and skills from classroom practice using scoring rubric 2. Assess knowledge and skills from term projects using scoring rubric 3. Classroom presentation, assessment by using scoring rubric	PLO4 PLO5 PLO6 PLO7
CLO5: Students are responsible, moral, ethical, disciplined, punctual, honest, and responsible for themselves and society.	4. Observing behavior, attending class, punctuality, providing feedback 5. Submitting assigned work on time and the quality of assigned work	PLO5
CLO6: Able to present a prototype to solve agricultural problems with embedded systems completely and correctly.	6. Presentation, answering questions and solving problems using appropriate language and IT technology for both individual and group work.	PLO6

CLO7: Have the skills to work with others as a good leader and a member and can adapt to various situations appropriately.	7. Observing behavior, teamwork and leadership-followership.	PLO7

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 measurement of learning achievement

            1) Classroom practice (individual work)   30%

            2) Term Project (group work)   50%

            3) Term Project presentation   10%

            4) Interest in learning, participation in class 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:**

    www.arduino.cc is a website that collects knowledge from basic to advanced for programming and using microcontrollers.

11. **Evaluation of teaching results**

    Students must evaluate teaching at www.kps.ku.ac.th (in KU Teaching System) with the university's teaching evaluation form before the mid-term and final exams.

11. **Review and improve teaching methods and teaching systems,**

    ☐ There is no review because..................

    ☑ There is a review based on the student evaluation results and the examination results.

        ☐ There are no revise or improvements.

        ☑ Revise and improve to be consistent with the results of student evaluation and examination which there were 48 students who were evaluated in the system out of 56 students (85.71%). There were suggestions for improving teaching methods and teaching systems, improving new teaching and learning, including "changing the method of ordering and collecting scores in the classroom".

12. **Teaching Improvement from Teaching Evaluation Results**

    ☐ No teaching evaluation results

    ☑ Teaching Evaluation The average score of the previous evaluation was 4.15 (from students who evaluated in the system)

☐ There are no improvements.

☑ There is development as: "<u>Explain the course syllabus clearly, including the learning outcomes of the course, teaching methods, and learning assessment, and seek approval from students in the classroom to make appropriate adjustments to teaching methods and learning assessment methods.</u>"

13. Study details table throughout the semester (attached)

Signature_____
(Mr. Pavit Tangwongkit)
18 November 2024

Schedule of activities related to teaching and learning

Friday *Lecture* 10:00-12:00 *Laboratory* 13:00-16:00 at the Computer & Mechatronic lab, Agricultural Mechatronics Laboratory Building.

No	Lesson	LLOs	L-Level	Teaching/Learning method	Assessment	Instructors	CLOs	PLO
1	Fundamentals of embedded system architecture	Able to explain the architecture of embedded systems.	K: An S: Precision A: Valuing	**Clarify and agree on details** -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 -Students use the control board and equipment provided by the course, one set per student, in every lesson. Students must check the operation of the board to ensure it is in usable condition. - Explain and demonstrate the basic architecture of embedded systems and have students follow along. - When students understand, have them practice by themselves under the supervision of the instructor and teaching assistants. -Test individual learning until students can do it.	-Assess individual knowledge and skills from classroom practice using scoring rubric -Observe behavior, attendance, punctuality, feedback, Teamwork and leadership	Pavit Surasak Chalvalit	CLO1 CLO5 CLO6 CLO7	PLO4 PLO5 PLO6 PLO7
2	Development of computer programs for embedded systems	-Students can write programs to use the embedded system.		- Explain and demonstrate the content of each time according to the teaching plan and have students follow along. - When students understand, have them practice by themselves under the supervision of the teacher and teaching assistant. - Test individual learning until students can do it.			CLO2 CLO5 CLO6 CLO7	
3	Connecting devices to embedded systems	-Students can connect various expansion devices to the embedded system.						

4	Identifying agricultural problems and their extent that can be solved by embedded systems	-Students can select and use various expansion devices together with embedded systems to solve agricultural problems appropriately. -Students can identify the scope of capabilities of embedded systems and various expansion devices used to solve agricultural problems.				CLO2 CLO3 CLO5 CLO6 CLO7
5-6	Designing embedded systems to solve agricultural problems	-Students can plan and design a prototype to solve agricultural problems with embedded systems.			-Assess knowledge and skills from project work (Term Project) using scoring rubric --Teamwork and leadership	CLO1 CLO2 CLO3 CLO4 CLO5
7-14	Development of embedded system prototypes for solving agricultural problems	-Students can create a prototype to solve agricultural problems with embedded systems.				CLO6 CLO7
15	Project presentation (Term-Project)	-Students can present prototypes to solve agricultural problems with embedded systems completely and correctly.		-Students present their projects (Term-Project) -Answer questions	-Class presentation using scoring rubric -Observing behavior, attendance, punctuality, feedback, teamwork, and leadership	