RQ02030 - POSTHARVEST TECHNOLOGY OF HORTICULTURAL CROPS

I. General information

- Term: 5
- Credit: 2 (Lecture: 1,5 – Practice: 0,5)
- Total credit hours for teaching and learning activities: 30 hours
  - Lectures and assigments: 22 hours
  - Practice in the laboratory: 8 hours
  - Self-study: 90 hours
- Department in charge:
  - Department of Postharvest Technology
  - Faculty of Food Technology
- Type of the course:

Foundation □		Fundamental ☒		Option 1, 2 □	
Compulsory □	Elective □	Compulsory ☒	Elective □	Compulsory □	Elective □

- Previous courses: RQ 01005 – Biology; PNH02003: Plant physiology
- Prerequisite course(s): None
- Teaching language: English □ Vietnamese ☒

2. Course objectives and expected learning outcomes

**** Course objectives***

- Course provides the students with fundamental knowledge in postharvest physiology and biochemistry changes of several horticultural crop groups and their relationship with postharvest losses.

- Course trains students with skills in: harvesting, handling, storing, transporting and marketing horticultural crops.

- Course forms students with attitudes of shelf-responsibility, having professional ethics in applying technical measures to ensure food quality and safety.

**** Course expected learning outcomes***

Notation	**Course expected learning outcomes** After successfully completing this course, students are able to	**PLO performance criteria**
Knowledge		
CELO1	Fully and Accurately assess the internal and external causes of post-harvest losses (quantity, quality) of some horticultural groups after harvest	2.1 (P)
CELO 2	Propose the appropriate technological solutions to harvest, preliminarily process, preserve, transport and	2.1 (P)

	consume horticultural products, reduce post-harvest losses, ensure quality and food safety	
Skills		
CELO 3	Follow the instructions on the process of harvesting, preliminary processing, preservation, transportation and consumption of horticultural products, reducing post-harvest losses, ensuring quality and food safety, and reducing adverse impacts to the environment	7.3 (R)
Attitude		
CELO 4	Strictly comply with regulations in the process of post-harvest management of horticultural products to ensure quality and food safety	9.2 (P)
CELO 5	Show the spirit of lifelong self-study, promote creativity to apply the technical solutions into practices	10.3 (P)

3. Course description

RQ02030. Postharvest handling of horticultural crops. (2TC:1,5-0,5-6). ***Content*****:** The course introduce the reasons causing postharvest quality losses and food safety of horticultural crop products. Application of postharvest handling techniques including harvesting, handling, storing, transporting and marketing horticultural products to reduce postharvest losses and ensure the product's quality and food safety and hazard/hygien.

4. Teaching and learning & assessment methods

CELOs	CELO1	CELO2	CELO3	CELO4	CELO5
Teaching and learning					
Lecturing	x	x		x	x
Assignment	x	x		x	x
Practices		x	x		x
Assessment					
Rubric 1. Assigment (20%)	x	x			x
Rubric 2. Practices (30%)	x	x	x	x	
Rubric 3. Final exam (50%)	x	x		x	x

5. Student tasks

- Attendance: All students taking this course have to attend at least 75% class for theory and 100% for practice.
- Preparation for the lecture: All students taking this course must read the relevant reference books, and lecture handout before the class

- Practices: All students have to participate in all practice class and complete the reports by groups.
- All students do assigments given by lecturers.
- Final exam: Students take a final examination when fulfill all requirements for the course.

6. Text books and references

**** Text Books/Lecture Notes:***

- Nguyễn Thị Bích Thủy. Lecture note version 2021.
- Hà Văn Thuyết, Cao Hoàng Lan, Nguyễn Thị Hạnh. 2015. Postharvest technology of fruits and vegetables. Hanoi Encyclopedian publisher.

**** Other references***

- Alexandru. M. Grumezescu (2017). Food preservation – Nano technology in agro-industry vol. 6. Academic press of Elservier. 761 trang. ISBN: 978-0-12-804303-5.
- Graham Seymour and Gregory A (2018). The Molecular Biology and Biochemistry of Fruit Ripening. Wiley-Blackwell Publisher.
- Nguyễn Thị Bích Thủy Đỗ Thị Lịu (2017). Effect of harvesting maturity and temperature on postharvest quality of tomato 'Savior'. Journal of Science and Development, No 15 (4): 419 -428.
- Thi Hanh Nguyen, Thi Phuong Thao Phan, Thi Bich Thuy Nguyen, Thi Thu Nga Nguyen (2018). Effects of Aloe Vera Gel Coatings on the Postharvest Quality of Honeydew melons (Cucumis melo L.) Stored Under Atmospheric Condition. Vietnam Journal of Agricultural Sciences. Vol 1 No 1.
- Elda B. Esguerra, Rosa Rolle (2018). Postharvest management of tomato for quality and safety assurance. Guidance for horticultural supply chain stakeholders. Food and Agriculture of organization of the United nations.

7. Course outline

Week	Content	Course expected learning outcomes
Tuần 1 - 3	***Chapter 1: Factors causing postharvest losses of horticultural crops***	
	A/ Main contents: (6 hours) **Theories:** 1.1. Introduction: Overview of biological characteristics of horticultural crops. An importance of postharvest technology (2 hours) 1.2. Chapter 1. Factors causing postharvest losses of horticultural crops (4 hours) 1. Pre-harvest factors causing postharvest losses of horticultural crops (1 hour) 1.1. Genetics/rootstock 1.2. Minerals 1.3. Irrigation	K1, K5

	1.4. Other cultivation techniques 2. 1. Post-harvest factors causing postharvest losses of horticultural crops (3 hour) 2.1. Biological factors (3 hours) 2.1. Classification 2.2. Postharvest physiology of horticultural crops 2.3. Postharvest pest 2.2. Environmental factors (1 hour) 3.1. Temperature 3.2. Relative humidity 3.3. Atmospheric composition 3.4. Light 2.3. Postharvest technique applications **Practice:** Lession 1. Determination of respiration rate of horticultural crops (3 hours)	
	***B/* Shelf-study**: *(30 hours)* 1.1. Anatomy of horticultural crops 1.2. Additional postharvest physiology of horticultural crops (senescence, germination...) 1.3. Postharvest bio-chemistry of horticultural crops: carbohydrates, protein, lipid, pigments, volatiles... 1.4. Nutritional composition of horticultural crops and its role in human health	K1, K4, K5
Tuần 4 – 7	**Chương 2. Harvesting**	
	A/ Main contents: (4 hours) **Theories:** 2.1. Concept 2.2. Maturity indices 2.3. Harvesting time 2.4. Harvesting methods **Practice:** Lession 2. Determination of fruits and vegetables maturity (2 hours) **Assignment:** - Developing maturity indices for different horticultural groups	K2, K3, K4, K5
	***B/* Shelf-study**: *(10 hours)* Searching references of maturity indices for different horticultural groups	
	Chương 3. Handling horticultural crops at packing house	
	A/ Main contents: (6 hours) **Theories:** 3.1.1. Type of postharvest handling 3.2. Dumping 3.3. Cleaning	K2, K3, K4, K5

	3.4. Sorting 3.5. Treatment 3.6. Packing	
	***B/* Shelf-study**: *(15 hours)* Searching references of postharvest handling of different horticultural groups including leafy vegetables, flowers, roots and tuber, fruits and seeds	
	Chương 4. Các phương pháp bảo quản sản phẩm	
	A/ Main contents: (4 hours) **Theories:** 4.1. Ventilation storage 4.2. Controlled/ Modified atmosphere storage 4.3. Low temperature storage 4.4. Chemical storage 4.5. Irradiation 4.6. Low presure storage **Practice:** Lession 3: Methods to cool fruits and vegetables *(3 tiết)* **Assigment:** - Analysis, comparison of advantage and dis-advantage of different method to store horticultural crops	K2, K3, K4, K5
	***B/* Shelf-study**: *(20 hours)* - Determination of storage methods for different horticultural groups including leafy vegetables, flowers, roots and tuber, fruits and seeds	
	Chương 5. Transportation – Distribution – Marketing products	
	A/ Main contents: (2 hours) **Theories:** 5.1.Transportation of horticulral products 2.2. Distributrion channels for horticulral products 5.3. Marketing of horticulral products	K2, K4, K5
	***B/* Shelf-study**: *(15 hours)* Searching references of distributrion channels and marketing for horticulral products. Determination of different distributrion channels.	K2, K4, K5