

Course (RQ03007): (SOILLESS CULTURE)

1. General information

- Term: 1
- Credits: **Total credits 2 (Lecture: 1.0 – Practice: 1.0)**
- **Self-study: 6** credits
- Credit hours for teaching and learning activities: 30 hours
- Self-study: 90 hours.
- Department conducting the course:
 - Department: Horticulture & Landscape design
 - Faculty: Agronomy
- Kind of the course:

Foundation <input type="checkbox"/>		Fundamental <input type="checkbox"/>		Specialization 1 <input checked="" type="checkbox"/>		Specialization 2 <input checked="" type="checkbox"/>	
Compulsory <input type="checkbox"/>	Elective <input type="checkbox"/>	Compulsory <input type="checkbox"/>	Elective <input type="checkbox"/>	Compulsory <input checked="" type="checkbox"/>	Elective <input type="checkbox"/>	Compulsory <input type="checkbox"/>	Elective <input checked="" type="checkbox"/>

- Prerequisite course(s): PNH02003 Plant Physiology

2. Course objectives and expected learning outcomes

* *Course objectives:*

- Knowledge: Course provided for students with knowledge in components and operation of soilless culture systems; role, function and use of growing media & nutrient solution; making the soilless cultivation process of horticultural crops.
- Skills: Course provides students with skills in preparing substrates, nutrient solutions, producing horticultural crops in growing media and hydroponic system.
- Attitude: Course provides students with attitudes in responsibility in compliance with laws related to safe crop production and environment protection.

* *Course expected learning outcomes*

Notation	Course expected learning outcomes After successfully completing this course, students are able to	PLO performance criteria
Knowledge		
CELO1	Choose the soilless culture system suitable for crop production with high yield, high quality, safety and environment protection.	2.1
CELO2	Apply soilless culture technology to make a soilless cultivation process of horticultural crops to meet market demands.	2.2
Skills		
CELO3	Produce successfully several horticultural products using soilless culture system	8.1
Attitude		
CELO4	Comply with laws related to safe crop production and environment protection.	9.2

3. Course description

Brief description of the course: This course comprises 4 chapters with following contents: history of soilless culture, current situation and development trend of soilless cultivation; introduction to soilless culture systems; nutritional requirement and nutrient absorption ability of plant root system; method of making nutrient solution; role and function of growing media; method of making growing media; soilless production of horticultural seedlings; soilless cultivation process of horticultural crops.

4. Teaching and learning & assessment methods

CELOs	CELO1	CELO2	CELO3	CELO4
Teaching and learning				
Ppt presentation	x	x		
Literature review	x	x		
Practice			x	x
Seminar	x	x		
Assessment				
Rubric 1. Literature review (10%)	x	x		
Rubric 2. Presentation (10%)	x	x		
Rubric 3. Practice (30%)			x	x
Rubric 4. Final Exam (50%)	x	x		

5. Student tasks

- Attendance: All students taking this course must attend fully and on time all theoretical and practical hours and seminars. Students must actively participate in discussing, putting and answering questions.
- Preparation for the lecture: All students attending this course must read in advance those lessons given by lecturers.
- Presentation and discussion: All students attending this course must take part in preparing lessons, presenting literature review results in seminars, actively participate in discussions with other groups.
- Practice: All students attending this course must participate in all practices. Need to work in groups and submit practice' portfolio in groups.
- Final exam: All students taking this course must attend the final exam

6. Text books and references

* **Text Books/Lecture Notes:**

1. Trần Thị Minh Hằng, 2022. Lecture note “Soilless culture”

* **Additional references:**

1. Howard M. Resh. 2013. Hydroponic Food Production. CRC Press. 511 pages.
2. J. Benton Jones, Jr. 2014. Complete Guide for Growing Plants. Hydroponically. CRC Press. 183 pages.
3. Md. Asaduzzaman. 2015. Soilless Culture: Use of Substrates for the Production of Quality Horticultural Crops. Published by AvE4EvA.
4. Stephanie Mohammed. 2018. Tomorrow’s Agriculture “NFT Hydroponics”-Grow within Your Budget. Springer Briefs in Plant Science.

7. Course outline

Week	Content	Course expected learning outcomes
1	Chapter 1: Introduction	
	A/ Main content: (2 hours) Theories: (2 hours) 1.1. Definition/concept of soilless culture 1.2. History of soilless culture 1.3. Application situation of soilless culture in the world 1.4. Application situation of soilless culture in Vietnam: disadvantage, advantage, development trend.	CELO1
	B/ Self-study contents: (6 hours) Application situation of soilless culture in the world and Vietnam	
.....	Chapter 2: Introduction to soilless culture systems	
	A/ Main content: (2 hours) Theories: (2 hours) 2.1. Hydroponic systems 2.2. Aeroponic systems 2.3. Substrate growing systems	CELO 1
	B/ Self-study contents: (6 hours) Components and operation of soilless culture systems	
.....	Chapter 3: Growing media	
	A/ Main content: (6 hours) Theories: (3 hours) 3.1. Introduction to growing media 3.2. Origin and characteristics of growing media 3.3. Component and physical properties of growing media 3.4. Component and chemical properties of growing media 3.5. Growing media preparation Practice: (3 hours) Practice 1: Growing media preparation	CELO 1 CELO 3, CELO 4
	B/ Self-study contents: (18 hours) Growing media	
.....	Chapter 4: Plant nutrition	
	A/ Main content: (6 hours) Theories: (3 hours) 4.1. Chemical properties of plant and their relation to nutritional requirement. 4.2. Essential mineral nutrients 4.3. Mineral nutrient deficiency symptoms in plants 4.4. Plant root system: structure and function 4.5. Types of fertilizers. 4.6. Principle of fertilizer application 4.7. Method of fertilizer application Practice: (3 hours)	K1

	Practice 3, 4, 5: Produce horticultural crops in growing media and hydroponic system (applying fertilizer)	CELO 3, CELO 4
	B/ Self-study contents: (18 hours) Plant nutrition in soilless culture systems	
.....	Chapter 5: Nutrient solution	
	A/ Main content: (2 hours) Theories: (1 hours) 5.1. Factors affecting nutrient solution 5.2. Preparation of nutrient solution 5.3. Principle of nutrient solution use 5.4. Nutrient solution supplying system Practice: (1 hours) Practice 2: Preparation of nutrient solution	CELO 1 CELO 3, CELO 4
	B/ Self-study contents: (6 hours) Hydroponic nutrient solutions	
.....	Chapter 6: Soilless seedling production	
	A/ Main content: (3 hours) Theories: (1 hours) 6.1. Nursery greenhouse and equipments 6.2. Disease control in nursery 6.3. Seedling production in nursery-tray 6.4. Seedling production in aeroponic system Practice: (2 hours) Practice 3, 4, 5: Produce horticultural seedlings in nursery-tray	CELO 1 CELO 3, CELO 4
	B/ Self-study contents: (9 hours) Soilless seedling production	
.....	Chapter 7: Soilless horticultural crop production technique	
	A/ Main content: (9 hours) Theories: (3 hours) - Cultivation process of horticultural crop in growing media - Cultivation process of horticultural crop in hydroponic system - Cultivation process of horticultural crop in aeroponic system Practice: (6 hours) Practice 3, 4, 5: Produce horticultural crops in growing media and hydroponic system.	CELO 1 CELO 3, CELO 4
	B/ Self-study contents: (18 hours) Soilless horticultural crop production technique	