

## Course (PQL02048): Soils and fertilizers

### 1. General information

- Term: 01
- Credits: **Total credits 02 (Lecture: 01 – Practice: 01)**
- **Self-study: 03** credits
- Credit hours for teaching and learning activities: 45 hrs
- Self-study: 90 hrs.
- Department conducting the course:
  - Department: Soil science and Plant Nutrition
  - Faculty: Natural resources and environment
- Kind of the course:

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

- Prerequisite course(s): No

### 2. Course objectives and expected learning outcomes

#### \* *Course objectives:*

- Knowledge: Course provided for students with knowledge about soils, soil formation elements, and processes, major soil characteristics in terms of physical, chemical, and biological and the relationships with plants, major characteristics and uses of soils in Vietnam, characteristics and technical uses of some popular fertilizers in Vietnam.
- Skills: The course provides students with skills in calculating original and productive fertilizers for using and doing fertilization research, analyzing some soil characteristics and fertilizer qualities, exactly identifying popular mineral fertilizers.
- Attitude: The course provides students with attitudes in group and independent working, in raising the sense of initiative in searching for academic information, articles, and books...related to soil fertilizer and plant nutrition.

#### \* *Course expected learning outcomes*

Notation	Course expected learning outcomes After successfully completing this course, students are able to	PLO performance criteria
<b>Knowledge</b>		
CELO1	Applied knowledge of soil and fertilizer in Horticulture and Landscape design	1.1
CELO2	Present soil formation elements and processes, major soil characteristics in terms of physical, chemical and biological and the relationships with plants, major characteristics and uses of soils in Vietnam	2.1
CELO3	Present characteristics and technical uses of some popular fertilizers in Vietnam	2.2

<b>Skills</b>		
CELO4	Perform skills in calculating original and productive fertilizers for using and doing fertilization researches, analyzing some soil characteristics and fertilizer qualities, exactly identifying popular mineral fertilizers. Coordinate in group and independent working	4.1
CELO4		
<b>Attitude</b>		
CELO5	Perform in raising the sense of initiative searching for academic information, articles, books...related to soil fertilizer and plant nutrition	9.2

### 3. Course description

This course includes 3 chapters introducing soil formation processes, basic soil characteristics in terms of physical, chemical and biological and the relationships with plants, major descriptions and uses of soils in Vietnam, characteristics and technical uses of some popular fertilizers in Vietnam.

### 4. Teaching and learning & assessment methods

CELOs	CELO1	CELO2	CELO3	CELO4	CELO5	
<b>Teaching and learning</b>						
Lecturing	x	x				
Teaching through practical work			x	x		
Case study			x	x		
Role-play teaching						
Group-based learning			x	x		
Assignment					x	
<b>Assessment</b>						
Rubric 1. Attendance (10%)				x	x	
Rubric 2. Assignment (10%)	x	x			x	
Rubric 3. Practical (10%)	x	x	x	x		
Rubric 4. Mid-term exam (10%)	x	x	x			
Rubric 5. Final exam (60%)	x	x	x			

### 5. Student tasks

- Attendance: All students must attend at least 75% of class hours and actively participate in class time by answering and asking questions.
- Preparation for the lecture: All students have to carefully read text and reference books before joining class hours and following the lecturer's instructions.
- Assignment: All students must write and submit their assignments.
- Mid-term exam: All students must join the mid-term exam.

- Final exam: All students must join the final examination.

## 6. Textbooks and references

### \* *Text Books/Lecture Notes:*

1. Nguyễn Như Hà, Lê Bích Đào. 2010. Giáo trình Phân bón. Nxb Nông nghiệp.
2. Nguyễn Thị Lan Anh, Nguyễn Thu Hà, Nguyễn Văn Thao, Nguyễn Thành Trung. 2019. Giáo trình Phân tích phân bón cây trồng. NXB Học viện Nông nghiệp.
3. Nguyễn Hữu Thành, Trần Văn Chính, Cao Việt Hà, Đỗ Nguyên Hải, Phan Quốc Hưng, Hoàng Văn Mùa & Nguyễn Thị Minh. 2017. Giáo trình thổ nhưỡng học. Nhà xuất bản Nông nghiệp Hà Nội.

### \* *Additional references:*

4. Nguyễn Như Hà, Nguyễn Văn Bộ. 2013. Giáo trình Cơ sở khoa học của sử dụng phân bón. Nxb Đại học Nông nghiệp.
5. Nguyễn Như Hà, Bùi Huy Hiền. 2016. Giáo trình Độ phì nhiêu đất. Nxb Đại học Nông nghiệp.
6. Trung Thanh Nguyen, Vinh Le Bui, Didier Lesueur, Mary Atieno, Cuong Tuan Nguyen, Ed Sarobol, Arunee Wongkaew, and Sutkhet Nakasathien. 2021. Cassava-cowpea intercropping system for controlling soil erosion in the Northern mountainous areas of Vietnam. *Asia-Pacific Journal of Science and Technology* 27(5): 1-11.

## 7. Course outline

Week	Content	Course expected learning outcomes
1-2	<b><i>Chapter 1: Origin, characteristics and use of main soil types in Vietnam</i></b>	
	<b><i>A/ Main contents: (6 hours)</i></b> <b><i>1. Theories (6 hours)</i></b> 1.1. Definition about soil formation processes and cultivated land 1.1.1. Soil formation processes 1.1.2. Cultivated land definition 1.2. Soil physical characteristics 1.2.1. Soil texture 1.2.2. Soil structure 1.2.3. Soil bulk density, particle density and porosity 1.3. Soil chemical characteristics 1.3.1. Soil organic matter 1.3.2. Soil adsorption capacity 1.3.3. Soil chemical reactions 1.4. Description and use of main soil types in Vietnam 1.4.1. Alluvial soil 1.4.2. Gray soil 1.4.3. Red soil <b><i>2. Practice: 6 (... hours)</i></b> Session 1. Analyzing soil total organic content	<i>K1, K2, K3, K4, K5</i>

	<p>Session 2. Analyzing soil salinity, exchangeable pH and hydrolysis pH</p> <p>Session 3. Analyzing available phosphorus and potassium in soil</p>	
	<p><b>B/ Self-study contents:</b> (18 hours)</p> <p>Students read documents about soil formation processes, soil characteristics and the relationship between soil-plant-fertilizer uses</p>	
3	<p><b>Chapter 2: The relationship between plant-soil-fertilizer and sustainable use of soil</b></p>	
	<p><b>A/ Main contents:</b> (3 hours)</p> <p><b>1. Theories</b> (3 hours)</p> <p>2.1. The role of fertilizers to plant and soil</p> <p>2.1.1. Fertilizers and crop yield</p> <p>2.1.2. Fertilizers and products' quality</p> <p>2.1.3. Fertilizers and farmers' income</p> <p>2.1.4. Fertilizers' role in soil protection and improvement</p> <p>2.2. Sustainable use of soil</p> <p>2.2.1. Definition</p> <p>2.2.2. Factors affecting sustainable use of soil</p> <p>2.2.3. Fertilizers and sustainable use of soil</p>	K1, K2, K4, K5
	<p><b>B/ Self-study contents:</b> (9 hours)</p> <p>Students read documents about the role of fertilizers in agricultural production and environment</p>	
4-5	<p><b>Chapter 3. Main characteristics and technical use of popular fertilizers in Vietnam</b></p>	
	<p><b>A/ Main contents:</b> (6 hours)</p> <p><b>1. Theories</b> (6 hours)</p> <p>3.1. Mineral fertilizers</p> <p>3.1.1. Nitrogen fertilizers and technical use</p> <p>3.1.2. Phosphorus fertilizers and technical use</p> <p>3.1.3. Potassium fertilizers and technical use</p> <p>3.1.4. Multi-element fertilizers</p> <p>3.2. Organic fertilizers</p> <p>3.2.1. General definition</p> <p>3.2.2. Role of organic fertilizers</p> <p>3.2.3. Some popular types of organic fertilizers</p> <p>3.2.4. Technical use of organic fertilizers</p> <p><b>2. Practice</b> (9 hours)</p> <p>Session 4. Identification of popular mineral fertilizers</p> <p>Session 5. Identification of popular green manures</p> <p>Session 6. Analyzing total nitrogen, phosphorus and potassium in fertilizers</p> <p>Session 7. Calculating fertilizer amounts in doing research and use in agricultural production</p>	K2, K3, K4, K5
	<p><b>B/ Self-study contents:</b> (18 hours)</p> <p>Students are required to read related documents about nutrition requirements of crops, nutrient role to crops, technical use of different kind of fertilizers</p>	

