

PROGRAM FOR UNDERGRADUATE
HORTICULTURE AND LANDSCAPE DESIGN
SPECIALIZATION 1: GREENHOUSE PRODUCTION AND MANAGEMENT

COURSE SPECIFICATION
RQ03009: BREEDING OF GREENHOUSE PLANTS

I. General information

- Term: 7
- Credits: **Total credits: 2 (Lecture: 1.0 – Practice: 1.0) - Self-study: 6.0**
- Credit hours for teaching and learning activities:
 - Lectures: 2 sections per week. 2 periods (250 minutes per section).
 - Practice in laboratory/greenhouse: 5 practices (250 minutes for each)
 - Self-study: 90 periods (50 minutes each)
- Department conducting the course:
 - Department: Genetics and Plant Breeding
 - Faculty: Agronomy
- Kind of the course:

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

- Parallel course(s): None
- Prerequisite course(s): RQ02018 - Principle of Plant genetics and Breeding
- Course language: English Vietnamese

II. Program learning outcomes

Program learning outcomes and program's performance criteria to which the course contributes:

Program learning outcomes After successfully completing this program, students are able to	Program Performance criteria
<i>Professional knowledge</i>	

Program learning outcomes After successfully completing this program, students are able to	Program Performance criteria
PLO2. Apply scientific knowledge and cultivation techniques to produce horticultural products to meet market demand.	2.1. Apply crop science knowledge to build high-tech demonstration farms/ advanced procedures for producing horticultural products to meet market demand.
<i>General skills</i>	
PLO5. Communicate effectively with stakeholders (farmers, clients, professionals, managers)	5.1. Collect, process and communicate information with stakeholders effectively.
<i>Professional skill</i>	
PLO6. Conducting research in plant breeding and crop production	6.1. Conducting a survey to identify research questions related to the real demand of agricultural production
	6.4. Providing logical conclusions and creative solutions to answer the research questions
<i>Attitudes</i>	
PLO10. Show a willingness to learn for life, an innovative and creative spirit to respond to rapid changes in science and technology.	10.2. Be willing to learn when given the opportunity to learn, and improve knowledge and capacity.

III. Course objectives and Learning outcomes

* Course objectives:

- Knowledge: Characteristics of plants grown under greenhouse conditions; breeding objectives, plant genetic resources. Methods for inducing genetic variation and selecting breeding materials/ cultivars.
- Skills: Experimental design for plant breeding under greenhouse conditions; Distinguish the target traits of plant species adapted to greenhouse conditions.
- Attitude: The course provide students with attitudes in a high sense of responsibility in work and study when given the opportunity.

* Course expected learning outcomes

This course contributes to program expected learning outcomes as follows:

I – Introduction; P – Practice; R – Reinforce; M – Master

Code	Course name	Program learning outcome's performance criteria				
		2.1	5.1	6.1	6.4	10.2
RQ03009	Breeding of greenhouse plants	R	R	R	R	M

Notation	Course expected learning outcomes After successfully completing this course, students are able to	Program Performance Criteria
Knowledge		
CELO1	Being able to use the knowledge of plant genetic resources, conservation and use of plant genetic resources in breeding; using different methods of mutation inducing, and selecting for self-pollination, cross-pollination, and asexual reproduction crops in plant breeding.	2.1
Skills		
CELO2	Conducting a survey to identify research questions in plant breeding related to the real demand for agricultural production	6.1
CELO3	Provide appropriate conclusions and solutions to solve the problem of research and breeding of greenhouse plants	6.4
CELO4	Collect and process information for effective report writing.	5.1
Attitude		
CELO5	Perform to improve knowledge and capacity in professional work.	10.2

IV. Course description

RQ03009. Breeding of greenhouse plants (Total credits 2: lecture 1 - practice 1 - self-study 6)

The course covers the following topics: Basic concepts, objectives and strategies of plant breeding for production under greenhouse conditions; Plant genetic resources; Methods of creating genetic variation in plant breeding; Plant breeding by selection methods for production in a greenhouse.

V. Teaching and learning methods

1. Teaching methods

Table 1: Matrix of Teaching methods and CELOs

Teaching methods	CELO1	CELO2	CELO3	CELO4	CELO5
Lecture	x				
Practice		x	x		
Essay	x			x	x

2. Learning methods

- Attend class lectures
- Practice
- Search and read documents
- Discussion and work in groups in class or in practical section.

VI. Student tasks

- Learning attitude: students must attend all lectures in class and practice.

- Prepare for lectures, self-study: students must read or prepare materials related to the lesson in class under the guidance of the lecturer.
- Practice and work in groups: students complete practical exercises, write individual reports or in groups under the guidance of lecturer.
- Essay and final exam: students must complete the essay and final exam in accordance with the regulations of the University.

VII. Assessment methods

1. Grading: 10

2. Average score of course is the total points of rubrics multiplied by the respective weight of each rubric.

3. Assessment summary

Table 2. Matrix of Assessment methods and CELOs

CELOs	CELO1	CELO2	CELO3	CELO4	CELO5	Week
Formative assessment (50%)						
Rubric 1. Practice (30%)		x	x			2, 5
Rubric 2. Essay (20%)	x			x	x	1-4
Summative assessment (50%)						
Rubric 3. Final exam (50%)	x					exam schedule

Rubric 1. Practice (30%)

Criteria	Percentage	Very Good 8,5 – 10 points	Good 6,5 – 8,4 points	Medium 4,0 – 6,4 points	Fail 0 – 3,9 points
Attitude	25	Always pay attention and participate in class activities	Quite attentive, participate when required	Attentive, less engaged	Do not pay attention, do not participate
Practical section	50	Good practice with care under the lab's rule	Good practice	Participate	Non-participation
Time management	25	Completing with less than requirement time	On time	Later than ≤5 minutes	Later than >5 minutes

Rubric 2. Essay (20%)

Criteria	Percentage	Good 8,5 – 10 points	Fair 6,5 – 8,4 points	Average 4,0 – 6,4 points	Poor 0 – 3,9 points
Content	60	Analyze clearly the importance of research	Analyze the importance of research quite clearly	Analyze is poorly evidenced	Analyze is not clear
Organization	20	Fully & imaginatively supports topic & purpose	Organization supports topic and purpose	Some signs of logical organization	Unclear organization
Use of sources	20	Uses variety of sources to support writer's idea.	Uses sources to support writer's idea.	Uses relevant sources but lacks in variety of sources	Neglects important sources

Rubric 3. Final exam (50%)

Final exam format: essay

Table 3. Performance indicators of Course expected learning outcomes

Final exam format: essay

Course expected learning outcomes	Indicators of Course expected learning outcomes
CELO1	<ol style="list-style-type: none"> 1. Characteristics of plants grown under greenhouse condition. Types of greenhouse. 2. Targets and breeding strategies. Standards for a good cultivar in greenhouse 3. Conservation and development of plant genetic resources 4. Methods for introducing genetic variation and selecting breeding materials/ cultivars.

4. Course requirements and policies

- Take the final exam: if students don't take the exam, they will get a score of 0 for that test.
- Practice Attendance: Students who do not complete the practice will not be able to take the final exam.
- Ethical requirements: attend class sufficiently, on time, actively participate in class lessons, practice, discussion. Do not do private work during class.

VIII. Text books and references

* *Text Books/Lecture Notes:*

1. Nguyen Thanh Tuan (2021). Lesson: Breeding of greenhouse plants.
2. Vu Van Liet, Nguyen Van Cuong, Dong Huy Gioi, Vu Thi Thu Hien, Tran Van Quang (2013). Principles and methods of plant breeding. Publishing house of VNUA.
3. Vu Van Liet, Tran Van Quang, Nguyen Van Cuong, Vu Thi Thu Hien, Nguyen Thanh Tuan, Ngo Thi Hong Tuoi, Pham Thi Ngoc, Nguyen Tuan Anh, Tran Thien Long (2017). Lesson: Breeding of vegetable and flower. Publishing house of VNUA.
4. Vu Van Liet, Vu Thi Thu Hien, Tran Van Quang, Nguyen Thanh Tuan, Ngo Thi Hong Tuoi, Pham Thi Ngoc, Nguyen Tuan Anh, Nguyen Xuan Thang (2021). Plant production and propagation. Publishing house of VNUA.

*** Additional references:**

5. Thomas J. Orton (2019). Horticultural Plant Breeding. Elsevier Science. <https://doi.org/10.1016/C2017-0-03393-1>
6. Truong Thi Hong Hai, Tran Nhat Linh, Nguyen Dinh Thanh (2019). growth, yield and quality of melon (cucumis melo l.) f1 hybrid varieties cultivated under plastic house conditions in spring-summer 2018 in THUA THIEN HUE. Hue University Journal of Science: Agriculture and Rural Development. Vol. 128 No. 3A. pages 57 – 66. DOI: 10.26459/hueuni-jard.v128i3A.4965
7. Nguyen Thi Hien, Dang Thi Van, Le Thi Thuy, Tran Thi Hong, Peter Hanson (2020). result of selection for imported tomato disease resistance lines/varieties in Gialam, Hanoi. Journal of Agriculture and Rural Development. 3/2020.
8. Doan Xuan Canh, Nguyen Dinh Thieu, Doan Thi Thanh Thuy, Nguyen Thi Thanh Ha (2021). The result of breeding and testing VT15 hybrids tomato. Journal of Agriculture and Rural Development. 5/2021

IX. Course outline

Week	Content	CELOs
1	Chapter 1: Concepts, aims and strategies of crop breeding for production under greenhouse condition	
	A/ Main content in class: (3 periods) Content of theoretical education: (2 periods) 1.1. Characteristics of greenhouse crops 1.2. Types of greenhouse 1.3. Breeding objectives and strategies 1.4. The standard for a good cultivar grown in a greenhouse Essay content: (1 period) - Analyzing the role of plant varieties in agricultural production adapting to climate change - Evaluating the current status of varieties production of the greenhouse plant in Vietnam: advantages, limitations, and prospects	CELO1; CELO4; CELO5

	<p>B/ Contents to be self-study at home: (9 periods)</p> <ul style="list-style-type: none"> - Refer to documents and research on breeding strategies of greenhouse plants; the actual crop production under greenhouse conditions in the locality of Vietnam. - Writing an individual essay under the guidance of the lecturer. 	
2	<p>Chapter 2: Plant genetic resources</p> <p>A/ Summary of the main content in class: (7 periods) Content of theoretical education: (3 periods)</p> <p>2.1. Concept of plant genetic resources 2.2. Erosion of plant genetic resources 2.3. Collection of plant genetic resources 2.4. Conservation of plant genetic resources 2.5. Evaluation and utilization of plant genetic resources</p> <p>Essay content: (1 period)</p> <ul style="list-style-type: none"> - The current status of collection and conservation of plant genetic resources in Vietnam - Analyzing the roles of plant genetic resources and conservation methods <p>Practical content: (3 periods) Lesson 1: Investigate the current status of plant genetic resources, assess genetic diversity and species diversity</p>	CELO1; CELO2; CELO3; CELO4; CELO5
	<p>B/ Contents to be self-study at home: (14 periods)</p> <ul style="list-style-type: none"> - Refer to documents, research on collection, conservation and use of plant genetic resources - Implement the individual essay 	
	<p>Chapter 3: Methods used to create genetic variation in plant breeding</p> <p>A/ Summarize the main content in class: (3 periods) Content of theoretical education: (2 periods)</p> <p>3.1. Hybridization method 3.1.1. General concepts 3.1.2. Sexual hybridization methods 3.1.3. Sexual hybridization techniques 3.2. Mutations induce genetic variability 3.2.1. Concepts and meanings 3.2.2. Classification of mutations 3.2.3. Mutagen types 3.2.4. Mutagenesis techniques 3.2.5. Selection on mutated generations 3.3. Polyploidy</p>	CELO1; CELO4; CELO5
3		

	<p>3.3.1. The concepts and roles of polyploidy in breeding</p> <p>3.3.2. Classification of polyploids</p> <p>3.3.3. Protocols for the induction of polyploids</p> <p>3.4. Inducing mutations based on the gene technologies</p> <p>Essay content: (1 period)</p> <ul style="list-style-type: none"> - Evaluation on the effectiveness of methods used to introduce the genetic variation in plant breeding 	
	<p>B/ Contents to be self-study at home: (9 periods)</p> <ul style="list-style-type: none"> - Refer to documents and research, update information on the methods used to induce methods in the world and in Vietnam 	
4	<p>Chapter 4: Selection methods in breeding of greenhouse plants</p>	
	<p>A/ Summary of the main content in class: (3 periods)</p> <p>Content of theoretical education: (2 periods)</p> <p>4.1. Natural selection</p> <p>4.2. Artificial selection</p> <p>4.3. Factors that influence the selection results</p> <p>4.4. Selection methods</p> <p>Essay content: (1 period)</p> <p>The effective methods used to select the breeding materials on flowering plants, tomatoes, and beans</p>	CELO1; CELO4; CELO5
	<p>B/ The contents to be self-study at home: (9 periods)</p> <p>Refer to documents and research, update information on the selection methods applied to self-pollinating, cross-pollination and asexual plants.</p>	
5	<p>Chapter 5: The breeding methods applied to some greenhouse plants</p>	
	<p>A/ Summary of the main content in class: (14 periods)</p> <p>Content of theoretical education: (2 periods)</p> <p>5.1. Breeding of rose and gladiolus</p> <p>5.2. Breeding of Lily/orchid</p> <p>5.3. Breeding of tomato and cucumber</p> <p>Practical content: (12 periods)</p> <ul style="list-style-type: none"> - Lesson 2: Differentiate and evaluate some criterias using for breeding in tomato - Lesson 3: Differentiate and evaluate some criterias using for breeding in cucumber - Lesson 4: Differentiate and evaluate some criterias using for breeding in rose - Lesson 5: Differentiate and evaluate some criterias using for breeding in gladiolus 	CELO1; CELO2 CELO3; CELO5

	B/ Contents to be self-study at home: (28 periods) - Refer to documents and research on breeding methods applied to some vegetables and flowers	
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X. Facility and other requirements:

- Classrooms are equipped with projectors, screens, computers, tables and chairs that can be moved easily to facilitate group discussions, practice rooms, and practice fields.
- Teaching facilities: Practical tools: scale, caliper, tape measure, magnifying glass, petri dish, compound knife, pruning shears, branch saw, hoe, rake, beam, bucket, umbrella, sprayer, nursery,
Practice materials: rootstock seeds, rootstocks, grafted nylon rope, potting bags, orchards for sampling, potting soil, fertilizers...
- E-learning: MSTeams online learning software, computers connected to the internet...

Hanoi, date.....month.....year.....

HEAD OF DEPARTMENT

(Full name and signature)

LECTURER

(Full name and signature)

DEAN OF FACULTY

(Full name and signature)

PRESIDENT

(Full name and signature)

APPENDIX
LIST OF LECTURERS AND ASSISTANTS FOR THE COURSE

Lecturer

Full name: Nguyen Thanh Tuan	Title: Assoc. Prof. PhD.
Address: Department of Genetics and Plant Breeding	Phone: 0961473666
Email: thanglongmos@yahoo.com ; thanhtuan@vnua.edu.vn	Web: https://www.vnua.edu.vn/trang-ca-nhan/nguyen-thanh-tuan-697
Contact with lecturers: by email, phone, meet face-to-face at the subject	

Commented [VDH1]:

Lecturer

Full name: Vu Thi Thu Hien	Title: Assoc. Prof. PhD.
Address: Department of Genetics and Plant Breeding	Phone: 0376603338
Email: vtthien@vnua.edu.vn ; yuhaihou@yahoo.com	Web: https://www.vnua.edu.vn/trang-ca-nhan/vu-thi-thu-hien-96
Contact with lecturers: by email, phone, meet face-to-face at the subject	

**ALIGNMENT BETWEEN COURSE EXPECTED LEARNING OUTCOMES,
TEACHING AND ASSESSMENT METHODS**

CELOs	CELO1	CELO2	CELO3	CELO4	CELO5
Teaching methods					
Lecture	x				
Practice		x	x		
Essay	x			x	x
Assessment methods					
Rubric 1. Practice (30%)		x	x		
Rubric 2. Essay (20%)	x			x	x
Rubric 4. Final exam (50%)	x				

CURRICULUM IMPROVEMENT TIMES:

- ❖ The first: 7/2019
 - Editing course objectives
- ❖ The second: 7/2020
 - Adding e-learning materials (updating content, interacting with students).
 - Update content and knowledge of courses and lectures according to the trend of fruit growing in Vietnam and in the world.
- ❖ The third: July 7, 2021
 - Additional online teaching methods such as using MS Teams software.
 - Update online lectures.