

Course (RQ02028): (*Research methods*)

1. General information

- Term: 7
- Credits: Total credits 2 (Lecture: 2 – Practice: 0)
- Self-study: 4 credits
- Credit hours for teaching and learning activities: 24 hrs
- Presentation and discussion in class: 3 hours
- Practice – Draft research proposal: 3 hours
- Self-study: 90 hrs.
- Department conducting the course:
 - Department: Experimental Methods and Biostatistics
 - Faculty: Faculty of Agronomy
- Kind of the course:

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

- Prerequisite course(s): None

2. Course objectives and expected learning outcomes

* *Course objectives:*

Knowledge: The course provides students with knowledge in research methods, problem identification and selection of appropriate research methods, search and selection of information.

Skills: The course provides students with skills in the key technical skills in design research experiments in reality, collect information, write reports and present research results.

Attitude: The course provides students with attitudes in express creative spirit in scientific research.

* *Course expected learning outcomes*

Notation	Course expected learning outcomes After successfully completing this course, students are able to	PLO performance criteria
General knowledge		
CELO1	Apply knowledge of scientific research methods to carry out scientific research in the field of horticulture and landscape design.	1.1
Professional skill		
CELO2	Survey for identifying problems those need to be researched	6.1
CLO3	Assess accurately the strengths, weaknesses, similarities and differences of research methods to select the appropriate research method.	6.2

CLO4	Implement properly research methods	6.3
CELO5	Provide appropriate conclusions and solutions to write research reports.	6.4
Attitude		
CELO5	Show the spirit of innovation in scientific research	10.3

3. Course description

Brief description of the course: This course provides: The role and importance of scientific research; Classification of scientific research; Research process; Identify ideas, problems and develop research proposals; Review of documents and sources of information; Basic concepts of experimental design and sampling in experimental research; Publication of research results.

4. Teaching and learning & assessment methods

CELOs	CELO1	CELO2	CELO3	CELO4	CELO5	CLO6
Teaching and learning						
Lecturing	x	x	x	x	x	x
Group discussion and presentation	x	x	x	x	x	x
Assessment						
Rubric 1. Attendance (10%)						x
Rubric 2. Mid-term exam (10%)	x		x	x	x	x
Rubric 4. Group discussion and presentation (20%)	x		x	x	x	x
Rubric 5. Final exam (60%)	x	x	x	x	x	x

5. Student tasks

- Attendance: All students taking this course must attend at least 70% of the class hours.
- Preparation for the lecture: All students taking this course must read the relevant book chapter and handout before the class.
- Presentation and Discussion: All students taking this course must give oral presentation about chosen topics by group.
- Final exam: All students must take the final exam

6. Text books and references

* **Text Books/Lecture Notes:**

1. Nguyen Thi Ngoc Dinh (2021). *Lecture of Research Methods*.

2. Vũ Đình Hòa, Vũ Thanh Hương (2014). Text book of Research Methods. Vietnam National University of Agriculture Publisher.

*** Additional references:**

Victoria E. Mc Millan (2017). Writing papers in the Biological sciences. Bedford/st.martins Macmilan learning.

Willie Tan (2018). Research Methods: A practical Guide for Students and Researchers. World Scientific Publishing Co.Pte.Ltd.

Lindsay D (2020). Scientific writing = thinking in word. 2nd edn. CSIRO Publishing, Melbourn.

*** Specialized journals related to crop science**

Dinh Thi Ngoc Nguyen, Roel Rodriguez Suralta, Mana Kano-Nakata, Shiro Mitsuya, Stella Owusu-Nketia & Akira Yamauchi, 2018. *Genotypic variations in the plasticity of nodal root penetration through the hardpan during soil moisture fluctuations among four rice varieties*. Plant Production Science, 21:2, 93-105. DOI: 10.1080/1343943X.2018.1439757.

Dinh Thi Ngoc Nguyen, Roel Rodriguez Suralta, Mana Kano-Nakata, Shiro Mitsuya, Stella Owusu-Nketia and Akira Yamauchi, 2020. Plasticity in Nodal Root Hardpan Penetration, Deep Soil Water Uptake, and Shoot Dry Matter Production under Soil Moisture Fluctuations Using Chromosome Segment Substitution Lines of Rice. PHILIPP AGRIC SCIENTIST Vol. 103 No. 3, 214-234.

Nguyen Thi Ngoc Dinh, Pham Tien Dung, Nguyen Hong Hanh, Do Thi Thanh, 2020. Effect of the Different Organic Nutrient Solutions on the Vegetative Growth, Yield and Quality of Water Spinach Cultivated by Using Circulating Hydroponic Technology and Growth Media Bed. Vietnam Journal of Agricultural Sciences. Vol. 18, No. 3: 167-177.

7. Course outline

Week	Content	Course expected learning outcomes
1,2	Chapter 1: Science, scientific research and the research process.	
	A/ Main contents: (6 hours) 1. Theories: (5 hours) 1.1. Science and scientific research 1.1.1. Scientific concept and scientific research. 1.1.2. Attributes of a good scientific study 1.1.3. Scientific method 1.2. Research purpose and basic steps in scientific research 1.2.1. Research purposes 1.2.2. Research engine 1.2.3. Steps of the research process	CELO1

	<p>Discussion: (1 hours)</p> <ul style="list-style-type: none"> - Identify research topics and ideas (0.5 hours) - Forming questions, research hypotheses and theoretical frameworks (0.5 hours) 	
	<p>B/ Self-study contents: (12 hours)</p> <ul style="list-style-type: none"> - Origin of scientific ideas in the past of famous scientists/scientists - The basis for forming research ideas, especially in the field of plant science - The fundamental difference of basic research and applied research. 	CELO 2,6
	Chapter 2: Research classification and experimental research methods	
	<p>A/ Main contents: (3 hours)</p> <p>1. Theories: (3 hours)</p> <p>2.1. Research classification</p> <p>2.2. Research methodology and research methods</p> <p>2.2.1. Research Methodology</p> <p>2.2.2. Research Methods</p> <p>2.3. Research Methods</p>	CELO 1
	<p>B/ Self-study contents: (26 hours)</p> <p>Research methods in general and empirical research methods in the specialty</p>	CELOs 3, 6
	Chapter 3: Identify the problem and develop a research proposal	
	<p>A/ Main contents: (6 hours)</p> <p>Theories: (6 hours)</p> <p>3.1. Attributes of a good research project</p> <p>3.2. Generating research ideas</p> <p>3.2.1. Test your strengths and interests</p> <p>3.2.2. Review previous topics</p> <p>3.2.3. Take notes and explore personal interests</p> <p>3.3. Turn ideas into research topics</p> <p>3.3.1. Research problem and research question</p> <p>3.3.2. Research hypothesis and objectives</p> <p>3.4. Write a research proposal</p> <p>3.4.1. Purpose of research proposal</p> <p>3.4.2. Research outline content</p>	CELO1
4,5	<p>B/ Self-study contents: (12 hours)</p> <ul style="list-style-type: none"> - Arguing the problem and forming, research questions/hypotheses - Formulating research goals 	CELOs 2,6

	Chapter 4: Overview of documents and sources of information	
6-7	<p>A/ Main contents: (6 hours) 1. Theories: (5 hours) 4.1. Objectives, content and overall structure 4.2. Information sources 4.2.1. Science magazine 4.2.2. Magazine summary 4.2.3 Proceedings of the conference 4.2.4. Theses and theses 4.3. Look up information and documents 4.3.1. Traditional information lookup 4.3.2. Look up information by computer and online Discussion: (1 hours) Effective document overview</p>	CELO1
	<p>B/ Self-study contents: (12 hours) - Objectives of the document overview - Document overview steps - Write an overview of the document and how to cite it</p>	CELO2,3 ,6
	Chapter 5: Basics of experimental design and sampling	
8	<p>A/ Main contents: (2 hours) 1. Theories: (3 hours) 5.1. Meaning of experimental design 5.2. Properties of a good experimental design 5.3. Important concepts in experimental design 5.3.1. The dependent variable and the independent variable 5.3.2. Irrelevant variable 5.3.3. Control, experimental group and control group 5.3.4. Experiment, experiment, experimental unit 5.4 Basic principles of experimental design 5.4.1. Principle of repetition and principle of randomization 5.4.2. Principle of local control 5.5. Some main experimental diagrams in experimental research 5.6. Reliability of measurements 5.7. External and external validity of the experimental design 5.8 Sampling and sampling strategy</p>	CELO1
	<p>B/ Self-study contents: (6 hours) - Error control, experimental design - Sampling, data collection, data processing</p>	CELO4, 6
9-10	Chapter 6: Write a research report	

