Course RQ01003**:** AGRO-METEOROLOGY

1. General information

- Term: I
- Credits: **Total credits 2 (Lecture: 1.5 – Practice: 0.5)**
- **Self-study: 6** credits
- Credit hours for teaching and learning activities: 30 hrs
- Self-study: 90 hrs.
- Department conducting the course:
  - Department: Agro-ecology
  - Faculty: Natural Resources and Environment.
- Kind of the course:

Foundation □		Fundamental □		Specialized	
Compulsory ☒	Elective □	Compulsory □	Elective □	Compulsory □	Elective □

- Prerequisite course(s): ……..

2. Course objectives and expected learning outcomes

**** Course objectives*:**

- Knowledge: The course aims to provide learners basic knowledge about weather, climate and their role in plants; thereby applying these knowlege to improve efficiency in the production of vegetables, fruits and ornamental plants.

- Skills: Course provide students with skills in conducting surveys and analyzing agro-meteorological data.

- Attitude: Course forms for learners a working attitude that upholds responsibility for environmental protection

**** Course expected learning outcomes***

Notation	**Course expected learning outcomes (CELOs)** After successfully completing this course, students are able to	**Program performance criteria (PPC)**
Knowledge		
CELO1	Applying knowledge of the mechanism of formation of weather and climate to analysis of their roles in plants	1.1
CELO2	Applying the rules of changing meteorological factors over time and space to solving problems related to weather and climate to improve the production efficiency of vegetables, fruits and ornamental plants	1.2
Skills		
CELO	Conducting surveys and analyzing agro-meteorological data	6.3
Attitude		
CELO…	Developing personal responsibility in rational use of climate resources in order to protect environment	9.2

3. Course description

Brief description of the course: This course consist of basic knowledge about meteorological and climate factors included solar radiation regime; atmosphere; the temperature regime in the soil and air; rain, evaporation and air humidity regimes; wind and disaster regimes; Effects of meteorological and climate factors on crops (vegetables, flowers, fruits and other trees) and methods to improve crop production efficiency; Methods of surveying, analyzing agro-meteorological indicators and assessing the impact of weather on vegetables, fruits and ornamental plants

4. Teaching and learning & assessment methods

CELOs	CELO1	CELO2	CELO3	CELO4
Teaching methods				
Lecturing	x	x		
Teaching through practical work			x	
Essay		x		x
Data analysis on computer			x	
Group-based learning				x
Assessment				
Rubric 1. Attendance and discussion in class (10 %)				x
Rubric 2. Practical (20%)		x		x
Rubric 3. Essay (20%)			x	
Rubric 4. Final exam (50%)	x	x		

5. Student tasks

- Attend all classroom session
- Prepare for the lecture: All students must read the reference materials according to the instructor's instructions before going to class
- Midterm test: students must take 01 midterm exam
- Essay: Students must complete 01 individual essay
- Practice: All students attending this module must attend 03 practice sessions and submit 01 practice report.
- Final exam: all students must take the final exam

6. Textbooks and references

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

Doan Van Diem et al (2005). Textbook of Agricultural Meteorology. Agriculture Publishing House, 312 pages

**** Additional references:***

- Meena, Ram Swaroop (2021). ed. Agrometeorology

Luo Q. (2011). Temperature thresholds and crop production: a review. Climate Change. 109:583-598. https://www.researchgate.net/publication/227581FFRitFm5rLQihCFPSNPkwLNBTbVZHUAnYc5iRYaWz9emon_A_review

Hollinger S.E and Angel J. (2017) Weather and Crops. http://extension.cropsciences.illinois.edu/handbook/pdfs/chapter01.pdf

Lalic, B., Eitzinger, J., Dalla Marta, A., Orlandini, S., Sremac, A. F., & Pacher, B. (2018). Agricultural meteorology and climatology (Vol. 8). Firenze University Press.

Mavi, H.S. and Tupper, G.T. (2004). Agrometeorology: principles and applications of climate studies in agriculture. The Haworth Press, Inc., New York, 364 pp.

Pradhan S, Sehgal VK, Bandyopadhyay KK, Panigrahi P, Parihar CM, Jat SL (2018). Radiation interception, extinction coefficient and use efficiency of wheat crop at various irrigation and nitrogen levels in a semi-arid location. Indian J Plant Physiol. 23(3):416-425. doi:10.1007/s40502-018-0400-x. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6208775/

7. Course outline

Week	Content	Course expected learning outcomes
w1	***Chapter 1: Solar radiation energy***	
	***A/* Main contents: (5 hours)** 1.1. Sun and features 1.2. Solar radiation intensity 1.3. Types of solar radiation 1.4. Solar radiation spectrum 1.5. Optical cycle 1.6. Effects of solar radiation on plants 1.7. Agricultural technical methods to ustilzing solar radiation	CELO1, CELO2, CELO3
	***B//* Self-study contents** (15 hours) Read the syllabus & materials provided by the lecturer in advance	CELO1, CELO2, CELO3
W2	***Chapter 2. Structure and components of the atmosphere***	
	A/ Main content: (3 hours) 2.1. Vertical structure of the atmosphere 2.2. Composition of the air in the layer close to the ground 2.3. The role of gases in plants 2.4. Agronomic methods to exploit air resources	CELO1, CELO2, CELO4

	***B/* Self-study contents**: *(9 hours)* Read the syllabus & materials provided by the lecturer in advance	CELO1, CELO2, CELO4
W2-3	***Chapter 3. Thermal regime of soil and air***	
	A/* Main content: (7 hours)* **Theory**: (*4 hours)* 3.1. Thermal properties of the soil 3.2. Factors that affect soil temperature 3.3. Variation of soil temperature 3.4. Heat mode of the air 3.5. Variation of air temperature 3.6. Accumulation of crops and their significance in agricultural production 3.7. Effect of soil and air temperature on plants 3.8. Agro-biological measures rational use of heat regime **Practice:** *(3 hours)* Lesson 1: Survey of agro-meteorological indicators in fields, net houses, greenhouses (priority on vegetable fields, flower gardens, fruit trees, ornamental plants)	CELO1, CELO2, CELO3, CELO4
	***B/* Self-study contents**: *(14 hours)* Read the syllabus & materials provided by the lecturer in advance	CELO1, CELO2, CELO3, CELO4
W3	***Chapter 4. Types of water in the atmosphere***	
	A/* Main contents:** *(6,5 hours)* **Theory:** *(3 tiết)* 4.1. Water cycle in nature 4.2. Evaporation process 4.3. Physical characteristics and variation of air humidity 4.4. Steam condensation process 4.5. Steam condensation products 4.6. Rain formation process and rain regime 4.7. Effect of rainfall and humidity on plants 4.8. Agro-biological measures to regulate rain and humidity **Practice:(2,5 hours)* Lesson 2. Analysis of agro-meteorological indicators (rainfall, evaporation, radiation) **Esay:** *(1 hours)* Instructing students to do exercises (evaluate the influence of weather on local production of vegetables, fruits and ornamental plants)	CELO1, CELO2, CELO3, CELO4

	***B/* Self-study contents**: *(13 hours)* Read the syllabus & materials provided by the lecturer in advance	CELO1, CELO2
	Chapter 5. Natural winds	
W4	***A/* Main content:** *(5,5 hours)* **Theory:** *(4 hours)* 5.1. Distribution of atmospheric pressure on the ground 5.2. Wind and wind characteristics 5.3. Forces affecting the wind 5.4. Circulation of the Earth – Trade wind 5.5. Monsoon in Vietnam 5.6. Some local winds (Fohn, land - sea..) 5.7. The influence of wind on agricultural production **Practise:** *(2,5 hours)* Lesson 2. Analysis of agro-meteorological indicators (humidity, temperature)	CELO1, CELO2, CELO3, CELO4
	***B/* Self-study contents** *(11 hours)* Read the syllabus & materials provided by the lecturer in advance	CELO1, CELO2
	Chapter 6. Climatic characteristics of the main vegetable, flower and fruit regions in our country	
W5	***A/* Main content:** *(3 hours)* **Theory:** 6.1. Major vegetable, flower and fruit growing areas 6.2. Climatic characteristics of the Northern Delta and Northern Vietnam 6.3. Climate characteristics of the Northern mountainous region 6.4. Climate characteristics of the North Central region 6.5. Climate characteristics of the South Central region 6.6. Climatic characteristics of the Central Highlands region 6.7. Climate characteristics of the Southern region	CELO1, CELO2
	***B/* Self-study contents**: *(6 hours)* Read the syllabus & materials provided by the lecturer in advance	CELO1, CELO2