Biophysics and Agrometeorology (1st Year of study, 1st Semester)

Credits (ECTS): 4

Course category: Domain (Compulsory courses)

Discipline Code: A.EMIAIA.F.104

Course holder: Lecturer Ilie BODALE, PhD

Objectives of the discipline:

The discipline objectives consist in the study of biophysical and agrometeorological to understand the living organisms and atmospheric behavior. Necessary knowledge for the advanced study of specialized subjects.

Contents (syllabus)

Course (chapters/subchapters)
1. Introduction. The aims and methods of biophysics
Notions of fluid biophysics **2. Molecular phenomena at the surface of liquids** 2.1. Surface layer. 2.2. Surface tension 2.3. Their role in the living and technique.
3. Molecular phenomena at the liquid-solid-gas contact 3.1. Capillary phenomena 3.2. Adsorption and absorption. 3.3. Their role in the living and technique.
4. Molecular transport phenomena 4.1. Dynamic and kinematic viscosity of liquids 4.2. Simple diffusion in liquid state 4.3. Osmosis in liquid state 4.4. Their role in the living and technique.
5. Fundamentals of meteorology 5.1. The role of agrometeorology 5.2. The Earth's atmosphere. The thermal structure of the atmosphere. 5.3. Solar radiation. The albedo of a surface. 5.4. Insolation. Diurnal and annual variation of insolation
6. Soil and air temperature 6.1 Soil temperature. Factors influencing soil warming. 6.2 Air temperature. Greenhouse effect. Factors influencing air heating. 6.3. The mechanisms of soil and air heating.

7. Dynamics of air masses 7.1. Air masses. Classification of air masses. 7.2. Atmospheric pressure. Baric formations. Vertical pressure variation. 7.3. The winds. Formation mechanisms. Classification of winds.
8. Water vapor and precipitation 8.1. Air humidity. Relative humidity of the air. Dew point. 8.2. Meteorological phenomena generated by the condensation of water vapor near the ground. 8.3. Condensation of water vapor in the atmosphere. Atmospheric precipitation. 8.4. Evaporation and evapotranspiration.
9. The influence of climatic factors on the growth and development of plants 11.1. The influence of temperature on plants. 11.2. The influence of light radiation on plants. 11.3. The influence of water on plants. 11.4. The influence of wind on plants.
10. Climatic accidents - Extreme weather phenomena 10.1. The frost. The formation mechanism of frosts. Effects of frosts on plants. Passive and active measures to reduce the effects of frost. 10.2. Hail. Hail formation mechanism. Effects of hail on plants. Passive and active measures to reduce the effects of hail. 10.3. Drought. Effects of drought on plants. Passive and active drought mitigation measures. 10.3. Excess water. Effects of excess water on plants. Passive and active measures to reduce the effects of excess water. 11.5. Blizzard, storms and tornadoes. Their effects on crops.

Practical activity
The presentation of the laboratory: Objectives and working methodology in the laboratory. Labor protection measures in the laboratory. Processing of measured data and error calculation.
Determination of the properties of biological liquids: The dynamic viscosity coefficient of liquids using the Oswald viscometer method. The surface tension coefficient of liquids using the Traube stalagmometer. Sugar concentration in fruit with Abbe refractometer.
Processing of agrometeorological data to characterize the weather: Daily, decadal, monthly, annual and multiannual minimum, maximum and maximum temperature. Amount of monthly, seasonal, annual and multiannual precipitation in different sub-climatic regions.
Representation of meteorological elements on weather charts: Minimum, average and maximum temperatures for the decades of a year. Annual precipitation.

Bibliography

1. **Bodale I.**, 2025 – „Biofizică și Agrometeorologie”, Suport de curs USV Iași;
2. Cazacu A., **Bodale I.**, Oancea S., 2021 – „Fenomene de transfer și operații unitare”, Iași, Ed. „Ion Ionescu de la Brad.
3. **Bodale I.**, 2021 – „Măsurarea și prelucrarea datelor meteorologice”, Iași: Editura „Ion Ionescu de la Brad”.
4. **Bodale I.**, 2024 – „Referate pentru laboratorul de Biofizică”, USV Iași.

5. Liviu Mihai Irimia (coordonator), autori: D. Cazacu, V. Vlahidis, C. Sîrbu, **I. Bodale**, et al, 2021 – „Manual de practică. Specializarea Horticultură", vol. 1, Iaşi: Editura Ion Ionescu de la Brad.

Evaluation

Evaluation form	Evaluation Methods	Percentage of the final grade
Final exam	Written examination	60 %
Evaluation of the activity during the semester	Written and oral assessments during the semester	40 %

Contact

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