

DISCIPLINE: Meteorology and Climatology

Specialization ENVIRONMENT ENGINEERING, 1th Year of study, 1th Semester

Credit value (ECTS): 4

Course category: mandatory

Course holder:

PhD Ilie BODALE, Assistant professor

Discipline objectives (course and practical works)

The aim of the course is to acquiring the knowledge of meteorology and climatology to study their influence on the environment.

- developing an independent and efficient study method by using appropriate bibliographic resources;
- developing the practical abilities to work in laboratory.

Contents (syllabus)

Course (chapters/subchapters)
Introduction in meteorology and climatology. Weather and climatology. Branches of meteorology. Weather station. Meteorological measuring and observations.
Atmosphere of Earth Earth's atmosphere. Mass of atmosphere. Thermal and chemical structure of atmosphere.
Solar radiation Spectral composition of Solar radiation Insolation. Solar radiation: direct, diffuse, absorbed and reflected. Albedo. Earth and atmospheric radiations. Radiation balance.
Soil and air temperature Soil temperature. Heat transfer in soil. Factors affecting the heating of the soil. Daily and annual soil temperature variations at different depths. Air temperature. Heat transfer mechanisms in air. Radiation absorption and transmission by different gases. Greenhouse effect. Multilevel model. Daily and annual air temperature variations.
Water vapors from atmosphere Air humidity. Specific, absolute and relative humidity of the air. The dew point. Daily and annual air humidity variations. Evaporation and evapotranspiration.

<p>Primary products of water vapor condensation</p> <p>The fog. Fog types. Clouds. International classification of clouds.</p>
<p>Precipitations</p> <p>Atmospheric precipitation. Precipitation classification. Bergeron's theory. Daily and annual precipitation variations.</p>
<p>Atmospheric pressure</p> <p>Variation of pressure with altitude. Pressure systems: low pressure area, high pressure area, trough, ridge and col. Daily and annual atmospheric pressure variations.</p>
<p>Dynamics of air masses</p> <p>Air masses. Air mass classification Atmospheric fronts. Hot, cold and occluded fronts. Atmospheric circulation. Winds. Genesis. Wind classification. Winds of the world, in Europe and Romania.</p>
<p>Electrical and optical phenomena in the atmosphere</p> <p>Electrical phenomena in the atmosphere. Classification of electric discharges. Lightning and thunderstorms. Light, color and atmospheric optics.</p>

Practical works
1. Presentation of the main meteorological phenomena.
2. Measurements and observations at the weather station.
3. Data processing. Calculation of diurnal, decadal, annual and multiannual averages of meteorological parameters.
4. Measurement of the air and soil temperatures.
5. Diagram of minimum, average and maximum temperatures for a period of time.
6. Measurement of direct, diffuse and reflected solar radiations using the pyranometer.
7. Determination of the relative humidity of the air by different methods (electric psychrometer, psychrometric table and direct measurement with the hygrometer).
8. Observations on clouds. Determination of different types of clouds.
9. Measurement of the precipitation. Determination of the annual precipitation quantity in different climatic regions.
10. Measurement of the atmospheric pressure. Reduction of pressure at sea level.
11. Measurement of the direction and speed using the gauge and anemometer.
12. Frequency wind rose diagram for a region in Romania.

Bibliography

- Ahrens C.D., “Meteorology today. An introduction to weather, climate and the environment”, 4th Edition, West Publishing Co., New York SUA, 1991.
- Oancea S., “About atmosphere, weather and climate”, PIM Publishing, Iasi, 2010.
- Enache L., “Agrometeorology”, USAMV Publishing, Bucharest, 2009.
- Ciulache S., “Meteorology and climatology”, University Publishing House, 2004.
- Moran J.M., Morgan M.D, “Meteorology. The atmosphere and the science of weather”, Burgess Publishing, Edina (USA), 1986.
- Pop Gh., “Introduction to meteorology and climatology”, St. Encycl. Publishing House, Bucharest, 1988.
- Salby M.L., “Fundamentals of Atmospheric Physics”, Academic Press San Diego, New York, Boston, 1997.
- Bodale Ilie, “Practical work of meteorology”, 2019.
- Vaduva Iulica, “Applications of climatology”, University Publishing House, 2004.

Evaluation

Evaluation form	Evaluation Methods	Percentage of the final grade
Course	Course activity	10%
	Test	10%
	Written exam	60%
Practical works	Laboratory activity evaluation	10%
	Projects	10%

Contact

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DISCIPLINE: Meteorology and Climatology

Specialization ENVIRONMENT ENGINEERING, 1th Year of study, 2nd Semester

Credit value (ECTS): 2

Course category: mandatory

Course holder:

PhD Ilie BODALE, Assistant professor

Discipline objectives (course and practical works)

The aim of the course is to acquiring the knowledge climatology to study the climate change and the influence of it on the environment.

- developing an independent and efficient study method by using appropriate bibliographic resources;
- developing the practical abilities to work in laboratory.

Contents (syllabus)

Course (chapters/subchapters)
1. The history of global temperature 1.1. Paleoclimate. 1.2. Climate in the Holocene. 1.3. The climate in Common Era. 1.4. Climate cycles. Climate in the last century.
2. Methods for determining the climatic ages 2.1. Oxygen isotope method. 2.2. Milankovitch cycle. 2.3. The "Bare rock" model. 2.4. The "Snowball" model. Sea level change.
3. The genetic factors of the climate 3.1. Radiative factors. 3.2. Physical-geographical factors. 3.3. Dynamic factors. 3.4. Anthropogenic factors.
4. Koppen-Trewartha climate classification 4.1. Koppen climate classification. Characteristics of different climates. Climate formulas. 4.2. Advantages and disadvantages of the Koppen's classification. 4.3. Trewartha-Horn climate classification.
5. Characterization of the climate in Europe and Romania 5.1. Factors which influence the climate in Romania. 5.2. Climate in Europe and Romania.

6. Climate risks. Global climate change

- 6.1. Climate risks. Drought. Frosts. Hail. Tornadoes.
- 6.2. Modification of the chemical composition of the atmosphere by anthropogenic factors.
- 6.3. Global warming.

Practical works

1. Presentation of the main climatological characteristics at global level.
Distribution of plants according to climatic characteristics.
2. Atmospheric fronts. Identification of different types of fronts.
Weather characterization methods based on weather phenomena.
3. Climate formulas. Identification and characterization of climates based on climate formulas.
4. Identification of climates in Europe and Romania.
5. Characterization of climates based on physical maps.
6. Climate risks. Analysis of climate risks in Romanian.

Bibliography

- Ahrens C.D., “Meteorology today. An introduction to weather, climate and the environment”, 4th Edition, West Publishing Co., New York SUA, 1991.
- Oancea S., “About atmosphere, weather and climate”, PIM Publishing, Iasi, 2010.
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- Pop Gh., “Introduction to meteorology and climatology”, St. Encycl. Publ., Bucharest, 1988.
- Salby M.L., “Fundamentals of Atmospheric Physics”, Academic Press, SUA, 1997.
- Bodale Ilie, “Practical work of meteorology”, 2019.
- Vaduva Iulica, “Applications of climatology”, University Publishing House, 2004.

Evaluation

Evaluation form	Evaluation Methods	Percentage of the final grade
Course	Course activity	10%
	Written exam	70%
Practical works	Laboratory activity evaluation	10%
	Projects	10%

Contact

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