



# POLYTECHNIC OF MEĐIMURJE IN ČAKOVEC

## COURSE SYLLABUS

ACADEMIC YEAR: 2020/2021

### 1. GENERAL COURSE INFORMATION

<b>1.1 Course name</b>	<b>Climatology and the environment</b>			
<b>1.2 Study program/s</b>	Undergraduate professional study Sustainable Development			
<b>1.3 Course status (O,E)</b>	E	<b>1.6 Mode of instruction (number of hours)</b>	<b>Lectures</b>	15
<b>1.4 Course code</b>	4106		<b>Exercises</b>	30
<b>1.5 Course abbreviation</b>	CAE		<b>Seminars</b>	
<b>1.6 Semester</b>	V		<b>E-learning</b>	
<b>1.7 ECTS</b>	4	<b>1.7 Place and time of instruction</b>	Premises of the Polytechnic of Međimurje in Čakovec, according to the schedule published on the website	

### 2. TEACHING STAFF

<b>2.1 Course leader/s-title</b>	Silvija Zeman, Ph.D, senior lecturer	<b>contact</b>	szeman@mev.hr
		<b>contact</b>	
<b>2.2 Assistant/s- title</b>		<b>contact</b>	
		<b>contact</b>	
<b>2.3 Instruction held by- title</b>		<b>contact</b>	

### 3. COURSE DESCRIPTION

<b>3.1 Course goals</b>	The course provides basic knowledge about the impact of the atmosphere on plants and animals and the impact of weather and climate on the organization of agricultural production. In addition to the above, the course also interprets the radiation of the Earth's surface, the counter-radiation of the atmosphere, energy calculation and the biological effects of solar and Earth radiation.								
<b>3.2 Prerequisites</b>	There are no conditions								
<b>3.3 Course outcomes</b>	After successfully completing the course, students will be able to:								
	11 Connecting atmospheric processes to the ecosystem and ecosystem functions in terms of the circulation of substances and energy that affect the climate, chemical processes in the atmosphere, water resources, biodiversity.								
	12 Present natural and anthropogenically induced changes and their impact on climate, water resources and biogeochemical cycles.								
	13 Critically assess ecological functions with respect to climatic, hydrological, pedological and biological conditions; on the impact of resource use and land cover change on climate.								
	14 Present the potential impact of global climate change on the ecosystem.								
<b>3.4 Course content</b>									
<b>3.5 Types of coursework</b>	x	Lectures	x	Exercises		Blended e-learning		Individual activities	Laboratory
	x	Seminars and workshops		Distant learning		Field classes		Multimedia and network	Mentorship

	Other																																																													
<b>3.6 Language of instruction</b>	Croatian / English																																																													
<b>3.7 Monitoring students' work (enter the number of ECTS credits for each activity so that the total number of ECTS credits is equal to the total ECTS value of the course, 1 ECTS = 30 hours)</b>	1,5	Class attendance	0,5	Seminars		Essay																																																								
	0,5	Class activity		Project		Report/paper																																																								
	0,5	Midterm exams		Laboratory exercises		Continuous knowledge check																																																								
		Written exam		Experimental work																																																										
	1,00	Oral exam		Research																																																										
<b>3.8 Assessment and evaluation of students' work during classes and at the final exam</b>	<table border="1"> <thead> <tr> <th>Activity specification</th> <th>Percent %</th> <th>Points</th> </tr> </thead> <tbody> <tr> <td colspan="3" style="text-align: center;">Assessment during instruction</td> </tr> <tr> <td>Attendance</td> <td>5%</td> <td>5</td> </tr> <tr> <td>Class activity</td> <td>5%</td> <td>5</td> </tr> <tr> <td>Seminar/ project/ essay</td> <td>30%</td> <td>30</td> </tr> <tr> <td>Midterm exam 1</td> <td>30%</td> <td>30</td> </tr> <tr> <td>Midterm exam 2</td> <td>30%</td> <td>30</td> </tr> <tr> <td colspan="3" style="text-align: center;"><i>Exam assessment for the students who failed to fulfill all the obligatory requirements during the semester</i></td> </tr> <tr> <td>Written exam</td> <td>60%</td> <td>60</td> </tr> <tr> <td><b>Total:</b></td> <td><b>100%</b></td> <td><b>100</b></td> </tr> </tbody> </table>						Activity specification	Percent %	Points	Assessment during instruction			Attendance	5%	5	Class activity	5%	5	Seminar/ project/ essay	30%	30	Midterm exam 1	30%	30	Midterm exam 2	30%	30	<i>Exam assessment for the students who failed to fulfill all the obligatory requirements during the semester</i>			Written exam	60%	60	<b>Total:</b>	<b>100%</b>	<b>100</b>																										
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<b>3.10 Specific features related with taking the course</b>	<p>If a student collects 50% of the points of each outcome, he / she directly takes the exam, provided that he / she has done practical work (exercises). A student cannot access the exam period if he / she has not achieved a min for each exercise. 60% correct answers. Practical work-exercises are made according to the instructions published on the Merlin system and are submitted by placing on the Merlin. Checking the completed exercises is done in the exercise classes after prior preparation with the teacher. Throughout the semester, the student is required to perform six exercises independently. Practical work (completed exercises) is taught until the last week of lectures. During the exam, it is possible to orally check the knowledge from practical work (exercises).</p>																																																													

	<p>If a student does not achieve a sufficient number of points on the midterm exam, he / she cannot take the next midterm exam.</p> <p>Once achieved points in intermediate exams for each learning outcome are no longer deleted unless the student decides to correct the result for each learning outcome, whereby the points won until then are deleted and newly achieved points for that learning outcome are entered.</p> <p>The final grade is obtained on the exam period and is the sum of points earned during classes.</p> <p>Students who did not take the colloquium access the written part of the exam where all learning outcomes are checked, and are required to have completed exercises before taking the exam.</p>
<b>3.11 Students obligations</b>	<p>Full-time students are required to attend at least 70% of the total number of hours of lectures and exercises in order to exercise the right to take the exam. Part-time students are required to attend at least 30% of the total number of hours of lectures and exercises in order to exercise the right to take the exam. If the student has not fulfilled all the obligations set by the course, he is obliged to attend the lectures again and meet the conditions for taking the exam.</p> <p>Attendance can be offset by online tuition, organised webinars and added assignments given by teachers. One lesson lasts 45 minutes, and several hours form a teaching unit. Absence from one teaching unit is counted as one absence. Delays and apologies are recorded separately. In that case, if the student missed more than 50% of classes, and has a justifiable reason/apology, the request should be submitted to the Department Council, which then decides on the justification of student absences with the obligatory opinion of the course leader.</p>
<b>3.12 Written assignments</b>	<p>Seminar papers must be computer written and may have a maximum of 12 text cards (Times New Roman, font 12) from introduction to conclusion, together with pictures, appendices to tables, etc. Seminar papers must have an adequate title page, content, marked pages and literature. The seminar paper should be divided into chapters and contain a list of references and a list of figures and tables and graphs and finally a summary / conclusion of 250 words. The student guarantees the authenticity of the work with his signature.</p>
<b>3.13 Required reading</b>	1. Nada Dadaček, T. Peremin Volf, 2008. Agroclimatology, Zrinski, Križevci
<b>3.14 Additional reading</b>	1. Bonan, GB, 2002. Ecological Climatology: Concepts and Applications, Cambridge University Press, Cambridge, UK, 678 p.
	2. Agricultural and Forest Meteorology, Journal, Elsevier Science Ltd. <a href="http://www.sciencedirect.com/">http://www.sciencedirect.com/</a>
<b>4 ADDITIONAL COURSE INFORMATION</b>	
<b>4.1 Quality control</b>	<p>The quality of the program, teaching process, teaching skills and level of mastery of the material will be established by conducting a written evaluation based on questionnaires, and in other standardised ways and in accordance with the by-laws of the Polytechnic of Međimurje in Čakovec.</p>
<b>4.2 Contact the teacher</b>	<p>Students can contact the teacher during the office hours and during classes, while for short questions and explanations they can contact him/her any day during working hours by coming in person or by landline. It is also possible to ask questions by e-mail, which will be answered in 48 hours at the latest. It is desirable for students to come as often as possible for any possible questions during the teacher's office hours.</p>
<b>4.3 Information about the course</b>	<p>It is the obligation of each student to be regularly informed about the course. All notifications about the classes or possible postponement of classes will be</p>

	posted on the bulletin board and on the website of the Polytechnic at least 24 hours in advance.
<b>4.4 Course contribution to the study program</b>	Interpret information, ideas, problems and solutions to professional and general audiences Advocate an ethical approach to work and to associates in project teams Identify significant environmental aspects within the organization for the purpose of management and compliance with standards and obligations

**5. ANALYSIS OF COURSE TOPICS (the number of hours is equal to the number of lectures and exercises of the course)**

<b>LECTURES</b>				
<b>Hours</b>	<b>Topic and description</b>	<b>Method</b>	<b>Learning outcomes</b>	<b>Course outcome</b>
		<ul style="list-style-type: none"> <li>• Direct teaching (lecture, instruction, pp presentation)</li> <li>• Discovery learning (individual, lead, discussion)</li> <li>• Group learning</li> <li>• Case study</li> <li>• Field classes...</li> </ul>		
1.	Introduction to the structure of the module, Weather and climate, Meteorology - historical development and branches, Atmosphere and division of the atmosphere	Presentation, pp presentation	Describe the atmosphere, define the climate and weather	I1
2.	Solar radiation on the Earth's surface; Insolation, Influence of relief on solar radiation. Application of solar energy	Presentation, pp presentation	Describe the effect of relief on solar radiation and application of solar energy	I1 I2
3.	Biological action of solar and Earth energy, Energy exchange in the biosphere, Heat in soil and water, Daily and annual course of soil temperature; Soil temperature measurement	Presentation, pp presentation	Interpret the exchange of energy in the biosphere, and the daily and annual course of soil temperature	I1 I2
4.	Daily and annual course of air temperature; Temperature distribution on Earth and in Croatia, Influence of relief on temperature; Temperature measurement; Frost protection, Importance of outdoor temperature for plants and animals	Presentation, pp presentation	Interpret the daily and annual course of air temperature, and predict the impact of outside temperature for plants and animals	I1 I2
5.	Biological sums; GDD degrees Temperature thresholds, Influence of time on photosynthesis and respiration	Presentation, pp presentation	Interpret the importance of the sum of heat units for the environment	I1 I2

6.	Evaporation and transpiration; Measurement and calculation of the amount of evaporated water, Water in the soil	Presentation, pp presentation	Interpret the concept of evaporation and transpiration	I1 I2
7.	Relative humidity	Presentation, pp presentation	Interpret the importance r elativn s humidity and air	I1 I2
8.	Evaporation and transpiration; Humidity in the air, Dew point;	Presentation, pp presentation	Explain the importance of humidity in the air for the environment	I1 I2
9.	Air vapor conversions in the air, Division of clouds according to shape and origin, Precipitation forms; Precipitation regime in Croatia, Measurement of precipitation; Hail defense	Presentation, pp presentation	Classify clouds by shape and demonstrate hail protection measures	I1 I2 I3 I
10.	Importance of atmospheric water for plants and animals, Lang rain factor; Drought index, Influence of relief on soil and air moisture, Atmospheric pressure; Atmospheric flow, air masses, fronts, cyclones	Presentation, pp presentation	Interpret concepts Atmospheric pressure; Atmospheric flow, air masses, fronts, cyclones	I2 I3
11.	Influence of substrate and relief on air mixing and flow, Seasonal winds, Meteorological reports and forecasts for agricultural needs, Impact of drought on the environment,	Presentation, pp presentation	Classify seasonal winds and describe the course of the substrate and relief on mixing and air flow	I2 I3
12.	Impact of excessive precipitation on agriculture and the environment - lysimeters Influence of temperature extremes on the environment	Presentation, pp presentation	explain the impact of temperature extremes on the environment on the environment	I3
13.	Annual course of time in Croatia; Phytoclimate, Microclimate, Walter climate diagram, Koppen climate division	Presentation, pp presentation	Interpret Phytoclimate, Microclimate, Walter's climate diagram, Koppen's climate division	I3 I4
14.	Climate changes	Presentation, pp presentation	Demonstrate the problem of climate change	I4
15.	Climate change reports - IPCC	Presentation, pp presentation	Interpret the IPCC Global Warming Report	I4
<b>EXERCISES/ SEMINARS</b>				

Hours	Topic and description	<b>Method</b> <ul style="list-style-type: none"> <li>• Direct teaching (lecture, instruction, pp presentation)</li> <li>• Discovery learning (individual, lead, discussion)</li> <li>• Group learning</li> <li>• Case study</li> <li>• Field classes...</li> </ul>	Learning outcomes	Course outcome
1.	Atmosphere and division of the atmosphere	Discovery learning, guided	Define the atmosphere	I1
2.	Solar radiation on the Earth's surface; Insolation, Influence of relief on solar radiation. Application of solar energy	Group learning	Predict the impact of relief on solar radiation and describe the importance of insolation	I1 I2
3.	Biological action of solar and Earth energy, Energy exchange in the biosphere, Heat in soil and water, Daily and annual course of soil temperature; Soil temperature measurement	Discovery-guided learning (study of scientific literature) seminars	Demonstrators measure soil temperature, describe the daily and annual course of soil temperature	I1 I2
4.	Daily and annual course of air temperature; Temperature distribution on Earth and in Croatia, Influence of relief on temperature; Temperature measurement; Frost protection, Importance of outdoor temperature for plants and animals	Guest lecturer, examples, discussion	Demonstrate frost protection measures and describe the distribution of temperatures on Earth and in Croatia	I1 I2
5.	Biological sums; GDD degrees Temperature thresholds, Influence of time on photosynthesis and respiration	Examples Discovery-guided learning	Apply methods for calculating temperature sums	I1 I2
6.	Evaporation and transpiration; Measurement and calculation of the amount of evaporated water, Water in the soil, Moisture in the air	Examples	Calculate the amount of evaporated water	I1 I2
7.	Colloquium 1 seminars	Seminars, discussion	Comment on current issues	I1 I2
8.	Evaporation and transpiration; Dew point; Relative humidity	examples	Determination of relative humidity	I2

<b>9.</b>	Air vapor conversions in the air, Division of clouds according to shape and origin, Precipitation forms; Precipitation regime in Croatia, Measurement of precipitation; Hail defense	Examples, discussion Discovery-guided learning (study of scientific literature) seminars	Interpret the example	12 13
<b>10.</b>	Importance of atmospheric water for plants and animals, Lang rain factor; Drought index, Influence of relief on soil and air moisture, Atmospheric pressure; Atmospheric flow, air masses, fronts, cyclones	Examples Discovery learning, guided	Calculation of at Lang's rain and cactor Connect a atmospheric pressure , a atmospheric flow, with river mass, fronts, cyclones	12 13
<b>11.</b>	Influence of substrate and relief on air mixing and flow, Seasonal winds, Meteorological reports and forecasts for agricultural needs, Impact of drought on the environment	Examples, discussion Discovery-guided learning (study of scientific literature)	Interpret the example	12 13
<b>12.</b>	Impact of excessive precipitation on agriculture and the environment - lysimeters Influence of temperature extremes on the environment seminars	Examples, discussion	Link temperature extremes and environmental problems, especially in agriculture	13
<b>13.</b>	Field work	Visit to the meteorological station	Describe meteorological devices and measurement methods	13 14
<b>14.</b>	Climate changes	Guest lecturer	Interpret the consequences and mitigation of climate change	14
<b>15.</b>	Seminars Colloquium 2	discussion	Comment on current climate issues	11-6