

**A COURSE SYLLABUS – DOCTORAL SCHOOL
REGARDING THE QUALIFICATION CYCLE FROM 2020 TO 2024**

GENERAL INFORMATION ABOUT COURSE				
Course title		Formation of water resources and soil water retention		
Name of the unit running the course		Doctoral School at University of Rzeszów		
Type of course (<i>obligatory, optional</i>)		Optional (specialist) compulsory subject to be chosen		
Year and semester of studies		II/Year, Summer semester 2021/2022		
Discipline		Agriculture and horticulture		
Language of Course		Polish		
Name of Course coordinator		Prof. dr hab. Ewa Czyż		
Name of Course lecturer		Prof. dr hab. Ewa Czyż		
Prerequisites		Basic knowledge of mathematics, soil science, meteorology, hydrology		
BRIEF DESCRIPTION OF COURSE (100-200 words)				
Expanding the knowledge of the importance of water in the environment. Improving the skills of the practical importance of shaping water resources and water retention of soils. Indication of the importance of the productive role of water for crops and explaining its functions in the environment. Acquiring the ability to independently develop the water balance and indicators of water consumption and use by arable crops.				
COURSE LEARNING OUTCOMES AND METHODS OF EVALUATING LEARNING OUTCOMES				
Learning outcome	The description of the learning outcome defined for the course	Relation to the degree programme outcomes (symbol)	Learning Format (Lectures, classes,...)	Method of assessment of learning outcomes (e.g. test, oral exam, written exam, project,...)
Knowledge (no.)	(Knows and understands)			
(no.1)	<ul style="list-style-type: none"> basic phenomena and processes of water management in relation to meteorological, climatic and environmental conditions to the extent that it is possible to revise the existing paradigms - global achievements, covering theoretical foundations and general issues related to water management of agricultural soils, main trends in the development of the scientific discipline agriculture and horticult 	P8S-WG/1 P8S-WG/2	(Lecture, Classes exercise)	Passing the test (Lecture); Passing all exercises with a grade and a final test (Classes exercise)
(no.2)	knows the methodology of scientific research in the discipline of agriculture and horticulture	P8S-WG/3	(Lecture, Classes exercise)	Passing the test (Lecture); Passing all exercises with a grade and a final test

				(Classes exercise)		
Skills (no.)	(Able to)					
(no.3)	Can use basic measurement techniques and unconventional techniques used to assess water resources. He/she knows how to use the acquired skills in solving problems related to the water management of soils. He/she skilfully combines various fields of science for creative identification and innovative problem solving in agriculture using modern research techniques	P8S-UW/1 P8S-UW/2	(classes exercise)	Passing all exercises with a grade and a final test (classes exercise)		
(no.4)	<ul style="list-style-type: none"> Is able to communicate on specialist topics – initiate a debate, participate in the scientific discourse, disseminate research results also in popular forms 	P8S-UK/1 P8S-UK/3 P8S-UK/4 P8S-UK/2	(classes exercise)	Passing all exercises with a grade and a final test (classes exercise)		
Social competence (no.)	(Ready to)					
(no.5)	<ul style="list-style-type: none"> a critical assessment of the achievements within the discipline of agriculture and horticulture; critically assess one`s own contribution to solving cognitive and practical problems 	P8S-KK/1 P8S-KK/2	(Lecture, classes exercise)	Passing the test (Lecture); Passing all exercises with a grade and a final test (Classes exercise)		
(no.6)	<ul style="list-style-type: none"> he/she is ready to implement the acquired knowledge and skills in solving cognitive and practical problems in the field of water resources management. Is aware of continuous improvement and cooperation with other units. Adheres to the principles of professional ethics. 	P8S-KK/3	(Lecture, classes exercise)	Passing the test (Lecture); Passing all exercises with a grade and a final test (Classes exercise)		
LEARNING FORMAT – NUMBER OF HOURS						
Semester (no.)	Lectures	Seminars	Lab classes	Internships	others	ECTS

IV	5	10	—	—	—	0
METHODS OF INSTRUCTION						
Lecture: lecture with multimedia presentation, discussion and reasoning. Classes exercise: analysis of texts with discussion, computer work, analysis of source materials, independent calculations, inference, preparation of reports.						
COURSE CONTENT						
<p>1. Lectures/ Seminars:</p> <p>1) Shaping and importance of water resources in the environment.</p> <p>2) The global hydrological cycle and its components.</p> <p>3) Water balance in Poland and in the world.</p> <p>4) Methods of soil water retention determination.</p> <p>5) Formation of the field water capacity of soils, unit water capacity and the rate of water use by crops.</p> <p>2. Seminars / Lab classes/ others:</p> <p>1) Characteristics of atmospheric precipitation.</p> <p>2) Determining the influence of air temperature on the value of evapotranspiration.</p> <p>3) Determining soil moisture for a selected year.</p> <p>4) Characteristics of soil filtration for the selected year. Depth of water runoff calculated on the basis of equations.</p> <p>5) Determination of the water content of various soil species depending on the method of their use and the level of mineral fertilization of plants.</p> <p>6) Characteristics of water retention of selected soil complexes.</p> <p>7) Soil water - research methods - the effects of water deficiency and excess in soil.</p> <p>8) Determination of soil and plant water balance elements.</p> <p>9) Determining the unit water consumption by selected crops.</p> <p>10) Indicators of water consumption and utilization by plants.</p>						
COURSE ASSESSMENT CRITERIA						
<p>The course will be carried out in the amount of 15 hours: 5 hours - lecture - ends with a credit, 10 h - exercises - end with a grade.</p> <p>The condition for completing the course is achieving all the assumed learning outcomes. Verification of learning outcomes on the basis of a positive assessment of the knowledge of lectures (written test with open questions). The condition to start writing a written test is to obtain a positive grade from the final test conducted in the form of open questions and to complete all exercises correctly.</p> <p>General marks for the exam and test: 55-60% -dst; 65-70% dst plus; 75-80% db; 85-90% -db; > 95-100% -b.db</p>						
TOTAL PhD STUDENT WORKLOAD REQUIRED TO ACHIEVE THE INTENDED LEARNING OUTCOMES – NUMBER OF HOURS AND ECTS CREDITS						
Activity			Number of hours			
Scheduled course contact hours			15			
Other contact hours involving the teacher (consultation hours, examinations)			5			

Non-contact hours – student's own work (preparation for classes or examinations, project, etc.)	20
Total number of hours	40
Total number of ECTS credits	0

INSTRUCTIONAL MATERIALS

Compulsory literature:	Czyż E. (2000) Uwilgotnienie gleb i zużycie wody przez rośliny w zależności od wybranych czynników agrotechnicznych. Pamiętnik Puławski, Zeszyt 123. Wydawnictwo IUNG Puławy. http://www.iung.pl/images/pdf/habilitacje/Cyz-hab.pdf
Complementary literature:	<ol style="list-style-type: none"> 1. Kożuchowski K. (2011) Klimat Polski. Nowe spojrzenie. Warszawa Wydawnictwo Naukowe PWN; 2. Bac S., Rojek M., (2012) Meteorologia i klimatologia w inżynierii środowiska. Wydawnictwo Uniwersytetu Przyrodniczego, Wrocław; 3. Czyż E.A., Niedźwiecki J., Dexter A.R. (2006) Wpływ niektórych parametrów fazy stałej gleby na retencję wodną w warstwie ornej gleb mineralnych. Zeszyty Problemowe Postępów Nauk Rolniczych 508: 27-39. p-ISSN: 0084-5477; 4. Czyż ,E.A., Vizitiu O.P. (2012) Water retention characteristic of some soils from the Lubelskie Voivodeship W: Practical applications of environmental research / ed. by Joanna Kostecka, Janina Kaniuczak. Rzeszów: Uniwersytet Rzeszowski, 2012: 51-63. http://www.ur.edu.pl/file/40151/Practical+Applications.pdf. p-ISBN: 978-83-931292-1-8 .; 5. Czyż, E.A., Dexter, A.R. (2012) Plant wilting can be caused either by the plant or by the soil. Soil Research (2011, as Aust. J. Soil Res.): A-F, CSIRO PUBLISHING Soil Research, 2012, 50, 708–713. http://dx.doi.org/10.1071/SR12189 www.publish.csiro.au/journals/sr 6. Książak, J., Bojarszczuk, J., Gałązka, A., Gawryjołek, K., Lenc, I., Jeske, M., Czyż, E.A. Król, M. (2018) Badania nad uprawą kukurydzy (Zea mays L.) w wieloletniej monokulturze i zmianowaniu. Seria: Monografie i Rozprawy Naukowe Instytutu Uprawy Nawożenia i Gleboznawstwa, Puławy: Instytut Uprawy Nawożenia i Gleboznawstwa - Państwowy Instytut Badawczy, 122 s. Monografie i Rozprawy Naukowe Instytutu Uprawy Nawożenia i Gleboznawstwa ; 58, p-ISBN: 978-83-7562-285-0, http://katalog.nukat.edu.pl/li/item?id=chamo:4534562&fromLocationLink=false&theme=nukat