

SYLLABUS – A COURSE DESCRIPTION

I. General information

1. Course name: **Seasonality of biological events_2020en**
2. Course code:
3. Course type (compulsory or optional): **optional**
4. Study programme name: **Environmental protection**
5. Cycle of studies (1st or 2nd cycle of studies or full master's programme): **2nd cycle of studies**
6. Educational profile (general academic profile or practical profile): **general academic profile**
7. Year of studies (if relevant): **I and II 2nd cycle of studies**
8. Type of classes and number of contact hours (e.g. lectures: 15 hours; practical classes: 30 hours):
lectures: 6 hours
practical classes: 24 hours
9. Number of ECTS credits: **3**
10. Name, surname, academic degree/title of the course lecturer/other teaching staff:
dr Paweł Bogawski, bogawski@amu.edu.pl
dr Łukasz Grewling, grewling@amu.edu.pl
11. Language of classes: **english**
12. Online learning – yes (partly – online / fully – online) / no: **There is a possibility to use b-learning methods when presenting basic knowledge about the phenological phases, systems, classifications and especially during the retrieving phenological data from Web sources as well as during the data processing. Selected discussion might be also completed using b-learning methods.**

II. Detailed information

1. Course aim (aims)
Seasonality is the presence of specific, regular variations in time series that occur in different branches of human activity and in the environment. Specifically, seasonality of biological events is connected with phenology that investigates the timing of recurring biological events, processes and the causes of their timing with regard to biotic and abiotic factors as well as the interactions among different phases. In this module, we aim to:
 - show the importance of seasonality in environmental management
 - introduce phenology as a seasonality science linking biosphere with climate, soils and human activity
 - discuss circadian rhythms in plants, animals and human
 - learn how to perform phenological plant and animal observations
 - establish and maintain phenological networks
 - study spatial and temporal vegetation changes in different biomes
 - develop simple phenological process-based models
 - show how the weather events influence biological processes
 - identify sudden, short-term weather phenomena that modify seasonality effects
2. Pre-requisites in terms of knowledge, skills and social competences (if relevant)
Basic computer skills.
3. Course learning outcomes (EU) in terms of knowledge, skills and social competences and their reference to study programme learning outcomes (EK)

Course learning outcome symbol (EU)	On successful completion of this course, a student will be able to:	Reference to study programme learning outcomes (EK)
EU_01	is able to define seasonality and phenology and indicates examples of phenological, seasonal processes in the environment	K_W01, K_W04, K_W08
EU_02	is able to distinguish phenological stages in plants and animals	K_U03, K_W04, K_U10
EU_03	is able to plan and perform phenological observations	K_U02, K_K03
EU_04	is able to establish and maintain simple phenological network	K_W05, K_U02, K_U03
EU_05	is able to forecast the timing of selected phenological stages based on meteorological data	K_U04, K_K01
EU_06	is able to handle different spatial and non-spatial data related to phenology and seasonality in different spatial and temporal scales	K_U03, K_U01, K_K01
EU_07	is able to give examples and explain how the weather phenomena affect biological and ecological processes	K_W01, K_W04
EU_08	is able to discuss and promote phenology as important in environmental management	K_U05, K_W08, K_U10, K_U08, K_W06, K_U07, K_K05

4. Learning content with reference to course learning outcomes (EU)

Course learning content	Course learning outcome symbol (EU)
Descriptions and definitions of seasonality and phenology as well as discussing and explaining the examples of phenology in biological processes	EU_01, EU_08
Phenological observations in the field	EU_02, EU_03
Retrieving phenological information from Web sources, time series data processing	EU_06
Forecasting the timing of selected phenophases using meteorological and satellite data. Satellite data processing.	EU_05, EU_06, EU_07
Investigating phenological changes in vegetation at a biome scale using satellite data	EU_06
Planning and establishing a simple phenological network, how to plan a phenological garden	EU_04

Discussing the circadian rhythms in plants and animals	EU_08
Primary and secondary phenological stages - phenological classification systems, standards	EU_02, EU_04, EU_03
Satellite-based and ground-based phenology - which is right? Panel discussion.	EU_08, EU_01, EU_07

5. Reading list

Wydawnictwa książkowe

1. Johnson A.: **Light, circadian and circannual rhythms**. Available at <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.512.8830&rep=ep1&type=pdf>, The Norwegian Academy of Science and Letters, Oslo, 2008

2. Hudson I, Keatley M R: **Phenological Research**, Springer, , 2010

3. Schwartz M.: **Phenology: An Integrative Environmental Science**, Springer, , 2013

Artykuły w czasopismach

1. Ozeki K. et al. (2015): **Weather and headache onset: a large-scale study of headache medicine purchases** , Int J Biometeorol, 59:447–451

2. Bogawski P. et al. (2019): **Predicting the onset of Betula pendula flowering in Poznań (Poland) using remote sensing thermal data.**, Sci Tot Environ, 658:1485-1499

3. Bogawski P. et al. (2016): **Flowering phenology and potential pollen emission of three Artemisia species in relation to airborne pollen data in Poznań (Western Poland).**, Aerobiologia, 32(2): 265–276

III. Additional information

1. Teaching and learning methods and activities to enable students to achieve the intended course learning outcomes (please indicate the appropriate methods and activities with a tick or/and suggest different methods)

Teaching and learning methods and activities	
Lecture with a multimedia presentation	X
Interactive lecture	X
Problem – based lecture	
Discussions	X
Text-based work	X
Case study work	X
Problem-based learning	
Educational simulation/game	
Task – solving learning (eg. calculation, artistic, practical tasks)	
Experiential work	X
Laboratory work	
Scientific inquiry method	
Workshop method	
Project work	X
Demonstration and observation	X

Sound and/or video demonstration	
Creative methods (eg. brainstorming, SWOT analysis, decision tree method, snowball technique, concept maps)	
Group work	X

2. Assessment methods to test if learning outcomes have been achieved (please indicate with a tick the appropriate methods for each LO or/and suggest different methods)

Assessment methods	Course learning outcome symbol							
	EU_1	EU_2	EU_3	EU_4	EU_5	EU_6	EU_7	EU_8
Written exam								
Oral exam								
Open book exam								
Written test								
Oral test								
Multiple choice test	X	X						
Project			X	X				
Essay								
Report					X	X	X	X
Individual presentation								
Practical exam (performance observation)								
Portfolio								

3. Student workload and ECTS credits

Activity types	Mean number of hours spent on each activity type
Contact hours with the teacher as specified in the study programme	30
Preparation for classes	10
Reading for classes	5
Essay / report / presentation / demonstration preparation, etc.	20
Project preparation	10
Term paper preparation	0
Exam preparation	15
Total hours	90
Total ECTS credits for the course	3

4. Assessment criteria according to AMU in Poznan grade system

Very good (bdb; 5,0): excellent knowledge, skills and personal and social competences

Good plus (+db; 4,5): very good knowledge, skills and personal and social competences

Good (db; 4,0): good knowledge, skills and personal and social competences

Satisfactory plus (+dst; 3,5): acceptable knowledge, skills and personal and social competences but with serious scarcities

Satisfactory (dst; 3,0): acceptable knowledge, skills and personal and social competences but with numerous mistakes

Unsatisfactory (ndst; 2,0): unacceptable knowledge, skills and personal and social competences