SYLLABUS – A COURSE DESCRIPTION

I. General informaion

1. Course name: **Air quality monitoring_en2020**
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: 10 hours**
> **laboratory classes: 20 hours**

9. Number of ECTS credits: **3**
10. Name, surname, academic degree/title of the course lecturer/other teaching staff:

> **dr Łukasz Grewling, grewling@amu.edu.pl**
> **dr Paweł Bogawski, bogawski@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 anthropogenic and natural air pollutants, and atmospheric transport mechanisms, as well as working online with computer softwares (GIS, HYSPLIT, retrieving web sources, local and regional databases).**

II. Detailed information

1. Course aim (aims)

> **Air pollution is one of the biggest health and environmental problems, causing 9% of deaths globally. According to the latest air quality database, 97% of cities in low- and middle income countries do not meet WHO air quality guidelines. A thorough understanding of natural and anthropogenic air pollutants sources, mechanisms of their formation, dispersion and deposition in the environment is crucial for the protection of human health and the environment as a whole. The main purposes of the proposed module is to:**
>
> **1) characterize in detail the hazardous anthropogenic (chemical) and natural (biological) air pollutants, including air particulate matter, ozone, benzene, sulfur dioxide, nitrogen oxides, pollen grains and fungal spores,**
> **2) describe the sources and processes related to atmospheric transport of air pollutants (release, dispersion and deposition),**
> **3) present the analytical methods of air quality monitoring,**
> **4) introduce to air pollution control & emissions reduction methods (urban planning, clean technologies),**
> **5) acquaint students with the web sources, local and regional databases and air quality models (Atmosphere Monitoring Service, AirBase, WHO air quality database, European Aeroallergen Network, SILAM, HYSPLIT model),**
> **6) decribe the impact of air pollutants on human health (emission**

thresholds, air quality guidelines).

Laboratory classes will be focused on:
1) analytical methods of detection and quantification of anthropogenic and natural air pollutants (in the laboratory and in the field)
2) practical guide for retrieving pollution and weather data from Web sources (computer workshop)
3) spatiotemporal analysis of air pollution – Geographic Information System (GIS) analysis (computer workshop)
4) dispersion modelling of air pollutants - HYSPLIT model (computer workshop)

2. Pre-requisites in terms of knowledge, skills and social competences (if relevant)

General knowledge in atmospheric chemistry and physics, meteorology, and plant ecology. 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	Characterize the most hazardous anthropogenic (chemical) and natural (biological) air pollutants	K_W01, K_W06, K_W02
EU_02	Use the appropiate methods of air quality monitoring (analytical, spatiotemporal & dispersion modelling), retrieve, analyse and interpret collected data, and make conclusions	K_U01, K_U02, K_U03, K_U07, K_K01
EU_03	Know and use the most important web sources, local and regional databases and air quality models	K_W09, K_W02, K_U10, K_K01, K_U01
EU_04	Indicate the impact of air pollutants on human health and environment as a whole	K_W02, K_U04, K_W06
EU_05	Organize and plan research work	K_U01, K_U02, K_U07, K_U03
EU_06	Recognize the air pollution control & emissions reduction methods	K_W05, K_W07, K_U03, K_U06, K_W02
EU_07	Describe the sources and processes related to atmospheric transport of air pollutants	K_W02, K_W06, K_W07

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

Course learning content	Course learning outcome symbol (EU)
Detail characteristic of the most hazardous anthropogenic (chemical) and natural (biological) air pollutants.	EU_01

Presentation and description of the sources and processes related to atmospheric transport of air pollutants	EU_07
Laboratory methods used in air quality monitoring, summary and interpretation of obtained data	EU_02, EU_05
Characteristic of air pollution control & emissions reduction methods	EU_06
Review of the impact of air pollutants on human health and environment as a whole	EU_04
Introduction to the most important web sources related to air quality monitoring, local and regional databases and air quality models	EU_03

5. Reading list

Wydawnictwa książkowe
1. Sofiev and Bergmann (Eds.): Allergenic pollen. A Review of the Production, Release, Distribution and Health Impacts., Springer, Dordrecht, 2013
2. WAO: White Book on Allergy (http://www.worldallergy.org/UserFiles/file/WAO-White-Book-on-Allergy_web.pdf), World Allergy Organization, , 2011
3. Burns, Gerald L: Air Pollution : Management Strategies, Environmental Impact and Health Risks, Nova Science Publishers, Hauppauge, New York, 2016
4. Sethi, Rajat: Air Pollution : Sources, Prevention, and Health Effects, Nova Science Publishers, Hauppauge, New York, 2013
5. Hollingsworth, John W.; Nadadur, Srikanth S.: Air Pollution and Health Effects, Springer, Heidelberg, 2015
Artykuły w czasopismach
1. Manisalidis et al. (2020): Environmental and Health Impacts of Air Pollution: A Review, Front Public Health., 8:14
2. Marino et al. (2015): Impact of air quality on lung health: myth or reality?, Ther Adv Chronic Dis, 6(5):286-98
3. Holgate S.T. (2017): Every breath we take: the lifelong impact of air pollution' – a call for action, Clin Med (Lond)., 17(1): 8–12.

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	
Problem – based lecture	
Discussions	X
Text-based work	
Case study work	
Problem-based learning	

Educational simulation/game	
Task – solving learning (eg. calculation, artistic, practical tasks)	X
Experiential work	X
Laboratory work	X
Scientific inquiry method	
Workshop method	
Project work	
Demonstration and observation	X
Sound and/or video demonstration	
Creative methods (eg. brainstorming, SWOT analysis, decision tree method, snowball technique, concept maps)	
Group work	

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
Written exam							
Oral exam							
Open book exam							
Written test							
Oral test							
Multiple choice test							
Project							
Essay							
Report	X	X		X		X	X
Individual presentation							
Practical exam (performance observation)		X	X		X		
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	5
Reading for classes	5
Essay / report / presentation / demonstration preparation, etc.	25
Project preparation	

Term paper preparation	
Exam preparation	20
Total hours	85
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