Annex 6

DISCIPLINE DESCRIPTION

1. Information on the study programme

1.1 Academic institution	**UNIVERSITY OF ORADEA**
1.2 Faculty	**FACULTY OF ENVIRONMENTAL PROTECTION**
1.3 Department	**ENVIRONMENTAL ENGINEERING**
1.4 Field of study	**ENVIRONMENTAL ENGINEERING**
1.5 Cycle of study	**BACHELOR**
1.6 Study programme/Qualification	**ENGINEERING OF BIOTECHNICAL AND ECOLOGICAL SYSTEMS / ENGINEER**

2. Information on the discipline

2.1 Name of discipline	**Air protection technologies**						
2.2 Course holder	**Lecturer Nandor Köteles Eng., Ph.D**						
2.3 Seminar/Laboratory/Project holder	**Lecturer Nandor Köteles Eng., Ph.D**						
2.4 Year of study	**III**	2.5 Semester	**V**	2.6 Type of evaluation	**Ex**	2.7 Regime of discipline	**DS**

(C) Compulsory; (O) Optional; (E) Elective

3. Total estimate time (hours per semester of didactic activities)

3.1 Number of hours per week	**4**	out of which: 3.2 course	**2**	out of which 3.3 seminar/laboratory/project	**2**
3.4 Total hours in the curriculum	**56**	out of which: 3.5 course	**28**	out of which 3.6 seminar/laboratory/project	**28**
Time allotment					hours
Study assisted by manual, course support, bibliography and notes					**15**
Additional documentation in the library/ on specialised electronic platforms and in the field					**15**
Preparation of seminars/laboratories/ topics/reports, portfolios and essays					**10**
Tutorship					**10**
Examinations					**3**
Other activities.....					**3**
3.7 Total hours of individual study	**56**				
3.9 Total hours per semester	**112**				
3.10 Number of credits	**4+1**				

4. Prerequisites (where appropriate)

4.1 curriculum	(Conditioning) Ecology, Meteorology.
4.2 competences	Knowledge of the most common technologies for protecting and purifying

	the air. Knowledge of the relevance of environmental protection and atmospheric purification in the context of environmental protection.

5. Conditions (where appropriate)

5.1. related to course	Videoprojector, Screen.
5.2. related to seminar/laboratory/ project	Instruments related to the running of the project hours Knowledge of the concepts contained in the design guide to be carried out

6. Specific competences acquired	
Professional competences	C1.4 Qualitative and quantitative analysis of natural phenomena and technological processes to prevent and mitigate environmental impacts C1.5 Identification of scientific solutions for the implementation of professional and technological projects C2.1 Description and application of concepts, theories and practical / technological / engineering methods for determining the state of environmental quality C2.3 Application of basic technical and technological knowledge in defining and explaining the concepts specific to engineering and environmental protection C3.5 Introducing the best methods of investigation available in environmental engineering projects C4.5 Development of special chapters in development projects that take into account the environmental impact C5.5 Elaboration of professional projects using the modeling and simulation methods of environmental processes C6.4 Analysis of Processes and Technology Projects to Reduce Environmental Impact
Transversal competences	CT2. Identifying roles and responsibilities in a multidisciplinary team and applying relationship techniques and effective work within the team

7. Objectives of discipline (coming from the specific competences acquired)

7.1 General objective	Through its content, this course continues and deepens the previously learned theoretical knowledge about atmospheric pollutants, presenting the basics of polluted air purification technologies from various pollution-generating technologies.
7.2 Specific objectives	Acquiring knowledge to enable: Knowing the symbols and technological schemes useful in design calculations or

	environmental inspections and the most modern protection technologies in combating environmental pollution.

8. Content*/

8.1 Course	Methods of teaching	No. of hours/Remarks
1. Technologies used to hold dust out of the air. Sedimentation isolation technologies	Interactive lecture with video projector	4
2. Centrifugal isolation technologies (cyclones and multicyclones)	Interactive lecture with video projector	4
3. Filtering isolation technologies (bag filters)	Interactive lecture with video projector	4
4. Electrical isolation technologies (electrofilters). Electrofilters with tubular electrodes, Electrofilters with plates	Interactive lecture with video projector	4
5. Wet sealing techniques (washing injector). The process of passing air through liquids, The process of spraying the liquid into the polluted air	Interactive lecture with video projector	4
6. Venturi air purification systems, wet cyclones	Interactive lecture with video projector	4
7. Sonic isolation technologies, impact isolation technologies or impact separators	Interactive lecture with video projector	4
8. Emission reduction technologies for nitrogen oxides. Mechanisms for the formation of nitrogen oxides, Classification of methods for the reduction of NOx emissions	Interactive lecture with video projector	4

Bibliography

1. Borota D., Costea Monica, 2000, *Poluarea aerului*, Editura Universităţii din Oradea;
2. Cojocaru I., 1995, *Surse procese şi produse de poluare*, Editura Junimea Iaşi;
3. Domuţa C., Brejea R., 2010, *Monitoringul mediului*, Editura Universităţii din Oradea;
4. Iordache Gh., 2003, *Metode şi utilaje pentru prevenirea poluării mediului*, Editura Matrix Rom, Bucureşti;
5. Köteles Nandor, 2011, *Noţiuni practice şi teoretice de poluare şi depoluare a aerului atmosferic*, Editura Universităţii din Oradea;
6. Köteles Nandor, 2014, *Tehnologii de protecţia aerului*, Notiţe de curs;
7. Mănescu S., Cucu M., Diaconescu M. L., 1994, *Chimia sanitară a mediului*, Editura Medicală, Bucureşti;
8. Moza (Pereş) Ana Cornelia, 2009, *Clima şi poluarea aerului în bazinul hidrografic Crişul Repede*, Editura Universităţii din Oradea;
9. Pereş Ana Cornelia, 2011, *Poluarea şi autopurificarea atmosferei*, Editura Universităţii din Oradea;
10. Rojanschi V., Bran Florina, Diaconu G., 1997, *Protecţia şi ingineria mediului*, Editura Economică, Bucureşti;
1. Tumanov S., 1989, *Calitatea aerului*, Editura Tehnică, Bucureşti.

8.4 Project		
Design of air protection equipment Designing devices that use the separation principle by centrifugation	Explanations on how to calculate	8

Sizing of a simple depositing chamber Determination of theoretical concentrations of atmospheric pollutants at ground level		
Determination of actual chimney height (at point sources)	Explanations on how to calculate	10
Calculation of ground theoretical concentrations at given points (determination of atmospheric diffusion capacity)	Explanations on how to calculate	10

Bibliography

1. Borota D., Buzaşiu Olimpia, 2001, *Tehnologii de protecţia aerului – Îndrumar practic în proiectele de specialitate şi probleme specifice*, Editura Universităţii din Oradea;
2. Iordache Gh., 2003, *Metode şi utilaje pentru prevenirea poluării mediului*, Editura Matrix Rom, Bucureşti;
3. Köteles Nandor, 2011, *Noţiuni practice şi teoretice de poluare şi depoluare a aerului atmosferic*, Editura Universităţii din Oradea;
4. Köteles Nandor, 2014, *Tehnologii de protecția aerului - Îndrumar de proiectare și lucrări practice* –Notițe de proiectare;
5. Pereş Ana Cornelia, 2011, *Poluarea şi autopurificarea atmosferei*, Editura Universităţii din Oradea;
6. Ordin MAPPM nr.462, 1993, *Condiţii tehnice privind protecţia atmosferei*, Bucureşti;
7. Ordin MAPM nr. 592, 2002, *Normativ privind stabilirea valorilor limită, a valorilor de prag şi a criteriilor şi metodelor de evaluare a dioxidului de sulf, dioxidului de azot şi oxizilor de azot, pulberilor în suspensie (PM_{10} şi $PM_{2,5}$), plumbului, benzenului, monoxidului de carbon şi ozonului din aerul înconjurător*, Bucureşti;
8. STAS nr.10331, 1992, *Principii şi reguli de supraveghere a calităţii aerului.*

* The content, respectively the number of hours allocated to each course / seminar / laboratory / project will be detailed during the 14 weeks of each semester of the academic year.

9. Corroboration of discipline content with the expectations of the epistemic community, professional associations and representative employers from the field corresponding to the study programme

- The content of the discipline is adapted and satisfies the requirements imposed by the labor market, being agreed by social partners, professional associations and employers in the field of the bachelor's program. The content of the discipline is found in the curriculum of the Environmental Engineering specialization and other academic centers in Romania that have accredited these specializations, so knowing the basic notions is a stringent requirement of the employers in the field of the environment.

10. Evaluation

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Share in the final grade
10.4 Course	Assessment of knowledge of course content - minimum grade 5	Oral exam	100%
10.5 Seminar	-	-	-
10.6 Laboratory	-	-	-

10.7 Project	- Drawing up and presenting a report - minimum grade 5	Supporting the project	100%
10.8 Minimum standard of performance			
Undertaking coordinated work to solve specific problems in the field, with the correct assessment of the workload, available resources, the time required to complete and the risks under the conditions of health and safety at work.			

Date of completion

Signature of course holder**

Lecturer Nandor Köteles Eng., Ph.D
kotelesnandor@yahoo.com

Signature of seminar laboratory/project holder **

Lecturer Nandor Köteles Eng., Ph.D
kotelesnandor@yahoo.com

Date of approval in the department

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Signature of the Head of Department

.....

Dean signature

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** - Name, first name, academic degree and contact details (e-mail, web page, etc.) will be specified.