

Universitatea din Oradea	PROCEDURA pentru inițierea, aprobarea, monitorizarea și evaluarea periodică a programelor de studii	COD: SEAQ PE – U. 01						
			4	5	6	7	8	9
			Aprobat în ședința de Senat din data: -- 03.03.2014					

Anexa 6

COURSE SYLLABUS

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	BIOTECHNICAL AND ECOLOGY SYSTEMS ENGINEERING/ENGINEER

2. Information on the discipline

2.1 Name of discipline	WATER TREATMENT I						
2.2 Course coordinator	Lecturer PhD.eng. PANTEA EMILIA - VALENTINA						
2.3 Laboratory/Project coordinator	Lecturer PhD.eng. PANTEA EMILIA - VALENTINA						
2.4 Year of study	III	2.5 Semester	V	2.6 Type of evaluation	E	2.7 Regime of discipline	C

(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	28	out of which 3.3 seminar/laboratory/project	28
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					20
Preparation of seminars/laboratories/ topics/reports, portfolios and essays					15
Tutorship					2
Examinations					4
Other activities.....					0
3.7 Total hours of individual study	56				
3.9 Total hours per semester	112				
3.10 Number of credits	4				

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4. Prerequisites (where appropriate)

4.1 curriculum	Hydrochemistry, Ecology, English
4.2 competences	Cognitive skills: concepts related to chemistry and biology related to water Action skills: information and documentation skills, group work, information technology use and data-processing skills; putting into practice the knowledge accumulated

5. Conditions (where appropriate)

5.1. related to course	Video Projector, computer
5.2. related to seminar/laboratory/ project	Equipment and laboratory reagents specific to laboratory work, computer

6. Specific competences acquired

Professional competences	<ul style="list-style-type: none"> C2. Management and resolution of specific environmental issues for sustainable development C2.5. Identifying the best technical and technological solutions for implementing professional projects for engineering and environmental protection C3. Analysis of technical solutions necessary to prevent, mitigate and eliminate adverse environmental phenomena
Transversal competences	<ul style="list-style-type: none"> CT2. Identifying roles and responsibilities in a multidisciplinary team and application techniques and effective work relationships within the team CT3. Effective use of information sources and communication resources and training aided (portals, Internet, specialized software, databases, online courses, etc.) both in Romanian and in an international language

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

7.1 General objective	The course aims to familiarize students to concepts related to protection of water resources, the water treatment technologies with the aim of using it as efficiently as possible with a minimal impact on the environment.
7.2 Specific objectives	7.2.1. Knowledge of the main methods of water treatment for use in various fields. 7.2.2. Assimilation and understanding of the main mechanisms of operation of installations and technological lines for water treatment 7.2.3. Proper implementation of techniques and technologies for water treatment in developing water treatment schemes in various fields 7.2.4. Determining the most effective strategies for the treatment of water with a low environmental impact

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8. Content*/

8.1 Course	Methods of teaching	No. of hours/Remarks
8.1.1. Generalities regarding obtaining drinkable and industrial water. Specific terms.	Interactive lecture, logic presentation, deductive explanation, and constructive conversation	2 The student's presence during the course is optional but recommended. The presence of the student in the examination is conditioned by participation in the laboratory works. The fraud during examination implies to exclude the student from examination and proposal for expulsion
8.1.2. Sources of water supply and the specific characteristics 8.1.2.1. Sources of the surface water 8.1.2.2. The underground water source	Interactive lecture, logic presentation, deductive explanation, and constructive conversation	2 The student's presence during the course is optional but recommended. The presence of the student in the examination is conditioned by participation in the laboratory works. The fraud during examination implies to exclude the student from examination and proposal for expulsion
8.1.3. Conventional treatment processes for production of drinking and industrial water.	Interactive lecture, logic presentation, deductive explanation, and constructive conversation	4 The student's presence during the course is optional but recommended. The presence of the student in the examination is conditioned by participation in the laboratory works. The fraud during examination implies to exclude the student from examination and proposal for expulsion
8.1.4. Coagulation / flocculation. The theoretical principles to coagulation-flocculation. Description of coagulation-flocculation process. The coagulation agents - flocculation. Factors which influence the coagulation-flocculation process. Machinery and equipment for coagulation-flocculation.	Interactive lecture, logic presentation, deductive explanation, and constructive conversation	4 The student's presence during the course is optional but recommended. The presence of the student in the examination is conditioned by participation in the laboratory works. The fraud during examination implies to exclude the student from examination and proposal for expulsion
8.1.5. Water filtration. The theoretical principles of filtration. Factors which influence the filtration operation. Filtration equipment.	Interactive lecture, logic presentation, deductive explanation, and constructive conversation	4 The student's presence during the course is optional but recommended. The presence of the student in the examination is conditioned by participation in the laboratory works. The fraud during examination

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		implies to exclude the student from examination and proposal for expulsion
8.1.6. Water disinfection. Disinfection with chlorine and chlorinated derivatives. Ozone disinfection. Disinfection with ultraviolet (UV)	Interactive lecture, logic presentation, deductive explanation, and constructive conversation	4 The student's presence during the course is optional but recommended. The presence of the student in the examination is conditioned by participation in the laboratory works. The fraud during examination implies to exclude the student from examination and proposal for expulsion
8.1.7. Process for the disposal of salts in the water. The use of chemical reagents for water softening. Processes of ion exchange water softening and demineralization	Interactive lecture, logic presentation, deductive explanation, and constructive conversation	4 The student's presence during the course is optional but recommended. The presence of the student in the examination is conditioned by participation in the laboratory works. The fraud during examination implies to exclude the student from examination and proposal for expulsion
8.1.8. Adsorption on activated carbon	Interactive lecture, logic presentation, deductive explanation, and constructive conversation	2 The student's presence during the course is optional but recommended. The presence of the student in the examination is conditioned by participation in the laboratory works. The fraud during examination implies to exclude the student from examination and proposal for expulsion
8.1.9. Flotation with dissolved air	Interactive lecture, logic presentation, deductive explanation, and constructive conversation	2 The student's presence during the course is optional but recommended. The presence of the student in the examination is conditioned by participation in the laboratory works. The fraud during examination implies to exclude the student from examination and proposal for expulsion
Bibliography		
<ol style="list-style-type: none"> 1. BÂRSAN, E. – <i>Retehnologizarea sistemelor de alimentare cu apă</i>, Editura Tehnică Științifică și Didactică, CERMI, Iași, 2003 2. BUIEMAN, J. P., - <i>Water Treatment Methods and Processes</i>, IHE lecture notes, Delft, Olanda, 1995 3. CARABEȚ A., - <i>Protecția resurselor de apă subterană</i>, Ed. Mirton, 1999 4. CARABEȚ A.,- <i>Procese poluante în apele de suprafață</i>, Ed. Mirton, 2001 		

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21. ***Ordin nr. 1718 din 23 decembrie 2004 Monitorul oficial al României din 25 martie 2005
22. *** STAS 1342-91 modificările din Legea 458/2002 și Legea 311/2004
23. WHO - *Guidelines for drinking water quality* (second edition) vol.II, Health criteria and other supporting information, Geneva, 1996

8.3 Laboratory		
8.3.1. Quality control of raw water and treated water in a water treatment plant. Categories and technical conditions of water quality	The case study, problem solving, individual, face-to-face or team work methods, methods of developing analytical, innovative, critical thinking.	2
8.3.2. Determination of the dose of coagulants with Jar-test method	The case study, problem solving, individual, face-to-face or team work methods, methods of developing analytical, innovative, critical thinking.	2
8.3.3. Determination of the dose of coagulants Jar-test method using floc JTL4	The case study, problem solving, individual, face-to-face or team work methods, methods of developing analytical, innovative, critical thinking.	4
8.3.4. The reduction of hardness of the water by means of ion exchangers	The case study, problem solving, individual, face-to-face or team work methods, methods of developing analytical, innovative,	2

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	critical thinking. innovative, critical	
8.3.5. The water demineralization	The case study, problem solving, individual, face-to-face or team work methods, methods of developing analytical, innovative, critical thinking.	2
8.3.6. Tracing the sedimentation curve based on the determination of the concentration of suspended solids at different time intervals without the addition of a coagulant	The case study, problem solving, individual, face-to-face or team work methods, methods of developing analytical, innovative, critical thinking.	2
8.3.7. Tracing the sedimentation curve based on the determination of the concentration of suspended solids at different time intervals with the addition of a coagulant	The case study, problem solving, individual, face-to-face or team work methods, methods of developing analytical, innovative, critical thinking.	4
8.3.8. Determination of filter material grading curve	The case study, problem solving, individual, face-to-face or team work methods, methods of developing analytical, innovative, critical thinking.	2
8.3.9. Removal of iron and manganese by filtration in sand columns coated with manganese dioxide layer	The case study, problem solving, individual, face-to-face or team work methods, methods of developing analytical, innovative, critical thinking.	2
8.3.10. Experimental determination of the adsorption isotherm	The case study, problem solving, individual, face-to-face or team work methods, methods of developing analytical, innovative, critical thinking.	4
8.3.11. Evaluation	The case study, problem solving, individual, face-to-face or team work methods, methods of developing analytical, innovative, critical thinking.	2
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24. WHO - *Guidelines for drinking water quality* (second edition) vol.II, Health criteria and other supporting information, Geneva, 1996

* 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

- By learning about the water treatment technologies, the students acquire consistent knowledge, according to the partial competences required for possible jobs provided by RNCIS
- Course content is adapted to the epistemic community requirements, professional associations and employers in the field of environmental engineering as it approaches the main techniques and water treatment technologies in order to use this in various domains thus ensuring a better management of water resources with a minimal impact on the environment
- During the course are accumulated knowledge useful both for environmental officers in local authorities, industry and also companies active in water treatment.

10. Evaluation

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Ratio of the final grade
10.4 Course	Evaluation of theoretical knowledge acquired	Exam - oral test	70%
10.5 Seminar	-	-	-
10.6 Laboratory	Evaluation of theoretical and practical knowledge acquired	Laboratory evaluation	30%
10.7 Project	-	-	-
10.8 Minimum standard of performance			
<ul style="list-style-type: none"> • Minimum 6 of the laboratory evaluation • Minimum 5 exam 			

Issuing date

Signature of course coordinator
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Date of approval in the department

Director of Department Signature
Assistant professor PhD.eng. **Laslo Vasile**
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Dean signature
Prof. PhD.eng. **CHEREJI IOAN**

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