

THE USE OF ACTIVATED SLUDGE MICROBIOLOGY ON PROCESS CONTROL

1	Course Title:	THE USE OF ACTIVATED SLUDGE MICROBIOLOGY ON PROCESS CONTROL
2	Course Code:	CEV4090
3	Type of Course:	Optional
4	Level of Course:	First Cycle
5	Year of Study:	4
6	Semester:	8
7	ECTS Credits Allocated:	3.00
8	Theoretical (hour/week):	2.00
9	Practice (hour/week):	0.00
10	Laboratory (hour/week):	0
11	Prerequisites:	None
12	Language:	Turkish
13	Mode of Delivery:	Face to face
14	Course Coordinator:	Dr. Öğr. Üyesi SEVİL Ç. ELEREN
15	Course Lecturers:	
16	Contact information of the Course Coordinator:	Dr. Öğr. Üyesi Sevil ÇALIŞKAN ELEREN sceleren@uludag.edu.tr 224 2942115 Bursa Uludağ Üniversitesi, Mühendislik Fakültesi, Çevre Mühendisliği Bölümü.
17	Website:	
18	Objective of the Course:	Teaching problems caused by various microorganisms which have significant importance on the operation of activated sludge systems and problem solutions
19	Contribution of the Course to Professional Development:	The student who completes this course can describe in detail the microorganisms existing in activated sludge system, which is one of the most basic biological treatment systems in the field of Environmental Engineering. In practice, while working as an operating engineer in a treatment facility, he / she gains knowledge about revealing the causes of problems in the system and finding solutions.
20	Learning Outcomes:	
	1	After the completion of the course, the student will be able to know identification and physiological characteristics of activated sludge microorganisms
	2	After the completion of the course, the student will be able to assess causes and solutions of problems which are caused by various microorganisms in activated sludge
	3	After the completion of the course, the student will be able to know settleability characteristics that determine solid separation problems
	4	After the completion of the course, the student will be able to use of microfauna as indicator of activated sludge systems
	5	After the completion of the course, the student will be able to have the knowledge to efficiently re-operate plants with solution methods
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21	Course Content:		
	Course Content:		
Week	Theoretical	Practice	
1	Description of activated sludge. Activated sludge microbiology.		
2	Solid separation problems in activated sludge.		
3	Identification and description of filamentous microorganisms. Measuring and enumeration methods of filamentous microorganisms in activated sludge.		
4	Diagnosis of causes of solids separation problems from microscopic examination of activated sludge.		
5	Settleability tests that determine solid separation problems. Evaluation of settling and foaming properties of activated sludge		
6	Various microorganisms. Control of filamentous bulking. Quiz 1		
7	Principles of kinetic selection of floc-forming microorganisms. Metabolic selection in activated sludge.		
8	Control of filamentous foaming.		
9	Non-filamentous microbiological problems in activated sludge.		
10	Midterm exam		
11	Protozoa and metazoa as an indicator of operating of activated sludge systems.		
12	Analyses of biomass microfauna to determine the sludge biotic index (SBI). Quiz 2		
13	Relationship between sludge biotic index and active sludge quality		
14	Student Presentation.		
22	Textbooks, References and/or Other Materials:	1- Mara D., Horan N. (2003) The Handbook of Water and Wastewater Microbiology, Academic Press, London, UK, 0-12-470100-0. 2- Eikelboom D.H. (2000) Process Control of Activated Sludge Plants by Microscopic Investigation, Latimer Trend&Co Ltd, Plymouth, UK, 1 900222 29 9. 3- Wanner J. (1994) Activated Sludge Bulking and Foaming Control, Technomic Publishing Co Inc., Lancaster, Pennsylvania, USA, 1-56676-121-2. 4- Jenkins D., Richard M.G., Daigger G.T. (2004). Manual on the Causes and Control of Activated Sludge Bulking and Foaming. Lewis Publishers Inc., CRC Press, Michigan, USA, 1-566-70647-5. 5- Richard M. (1989). Activated Sludge Microbiology. The Water Pollution Control Federation, Alexandria, Virginia, 0-943-244-27-7.	
23	Assesment		
TERM LEARNING ACTIVITIES		NUMBE R	WEIGHT
Midterm Exam		1	15.00
Quiz		2	10.00
Home work-project		1	15.00

Final Exam	1	60.00
Total	5	100.00
Contribution of Term (Year) Learning Activities to Success Grade	40.00	
Contribution of Final Exam to Success Grade	60.00	
Total	100.00	
Measurement and Evaluation Techniques Used in the Course	In order to determine the success of the students, questions in the form of classical and multiple-choice test are asked in the exams. In addition, with the homework given within the course, it is ensured that the theoretical knowledge given in the course is reinforced in practice. These activities are evaluated in determining the success grade.	
24	ECTS / WORK LOAD TABLE	

Activites	Number	Duration (hour)	Total Work Load (hour)
Theoretical	14	2.00	28.00
Practicals/Labs	0	0.00	0.00
Self study and preperation	14	1.00	14.00
Homeworks	1	10.00	10.00
Projects	0	0.00	0.00
Field Studies	0	0.00	0.00
Midterm exams	1	11.00	11.00
Others	2	5.00	10.00
Final Exams	1	20.00	20.00
Total Work Load			93.00
Total work load/ 30 hr			3.10
ECTS Credit of the Course			3.00

25	CONTRIBUTION OF LEARNING OUTCOMES TO PROGRAMME QUALIFICATIONS															
	PQ1	PQ2	PQ3	PQ4	PQ5	PQ6	PQ7	PQ8	PQ9	PQ10	PQ11	PQ12	PQ13	PQ14	PQ15	PQ16
ÖK1	0	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0
ÖK2	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ÖK3	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ÖK4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ÖK5	5	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0
LO: Learning Objectives PQ: Program Qualifications																
Contribution Level:	1 very low		2 low		3 Medium		4 High		5 Very High							