TREATMENT OF WASTEWATER SLUDGES

1	Course Title:	TREATMENT OF WASTEWATER SLUDGES	
2	Course Code:	CEV4047	
3	Type of Course:	Optional	
4	Level of Course:	First Cycle	
5	Year of Study:	4	
6	Semester:	7	
7	ECTS Credits Allocated:	2.00	
8	Theoretical (hour/week):	2.00	
9	Practice (hour/week):	0.00	
10	Laboratory (hour/week):	0	
11	Prerequisites:	-	
12	Language:	Turkish	
13	Mode of Delivery:	Face to face	
14	Course Coordinator:		
15	Course Lecturers:		
16	Contact information of the Course Coordinator:	Prof. Dr. N. Kamil SALİHOĞLU E-posta: nkamils@uludag.edu.tr Telefon: 0-224-2942118 Adres: Bursa Uludağ Üniversitesi, Mühendislik Fakültesi, Çevre Mühendisliği Bölümü, 16059,Görükle /BURSA	
17	Website:		
18	Objective of the Course:	1. Giving information about sources, amounts, characteristics and rational management of wastewater sludges, 2. Giving knowledge for proper stabilization technologies of sewage sludges 3. Designing projects including proper thickening, dewatering, conditioning, drying methods according to sludge sources and to make cost analysis. 4. Making research on the recovery, reuse and disposal options of sewage sludges.	
19	Contribution of the Course to Professional Development:	Engineer candidates are trained in sludge management who are ready to work in sludge management projects with different earnings such as planning, project design, cost, engineering calculations and management approaches.	
20	Learning Outcomes:		
		1	Determine the characteristics and amount of sludges from different treatment plants.
		2	Minimize potential health and environmental risks originating from waste sludges
		3	Offer a technical solution for sludge thickening, conditioning, dewatering, stabilization, landfilling, land application, incineration, etc.
		4	Determine the best available sludge disposal alternative using cost-benefit analysis.

	5	Make literature and technological survey on the developments of sludge disposal options in the country and in the world.
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21	Course Content:

Course Content:

Week	Theoretical	Practice
1	Introduction, sources of treatment sludges, characteristics of treatment sludges Determination of project topics and groups.	
2	Disposal methods of treatment sludges, transport and pumping of sludges	
3	Chemical treatment sludges,	
6	Sludge stabilization, stabilization methods,	
7	Anaerobic digestion	
9	Aerobic digestion, composting,	
	dewatering techniques,	
	sludge drying, presentation of group projects.	
13	Incineration, disinfection, presentation of group projects, final report submission of group projects.	
14	Ultimate sludge disposal methods, land disposal of treatment sludges, reuse of sludges, presentation of group projects.	

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	7	1.00	7.00
Homeworks	0	0.00	0.00
Projects	0	0.00	0.00
Field Studies	0	0.00	0.00
Midterm exams	1	10.00	10.00
Others	0	0.00	0.00
Final Exams	1	15.00	15.00
Total Work Load			60.00
Total work load/ 30 hr			2.00
ECTS Credit of the Course			2.00

22	Textbooks, References and/or Other Materials:	1-Cleverson Vitorio Andreoli, Marcos von Sperling and Fernando Fernandes (editors). Sludge treatment and disposal / London; New York: IWA Publishing, 2007. 2-Eliot Epstein, Boca Raton.Land application of sewage sludge and biosolids / :Lewis Publishers , 2003 3-Tchobanoglous, G., "Wastewater Treatment, Disposal and Reuse", New York, Metcalf &Eddy, Mc Graw-Hill Book Comp., 2003. 4-Vesılınd, P.A., "Treatment and Disposal of Wastewater Sludges", Ann Arbor Science Pub, 1978. Filibelli, A., “Arıtma Çamurlarının İşlenmesi”DEÜ Basım Ünitesi, 1996, İzmir. 5-Environmental Protection Agency (EPA), Dewatering Municipal Wastewater Sludges, Cincinnati, 1987. 6. Atıksu Arıtma Çamurlarının İşlenmesi ve Bertarafı, Türkiye Belediyeler Birliği, 2015.
23	Assesment	

TERM LEARNING ACTIVITIES	**NUMBER**	**WEIGHT**
Midterm Exam	1	20.00
Quiz	0	0.00
Home work-project	1	20.00
Final Exam	1	60.00
Total	3	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		Student-centered assessment and evaluation methods and techniques are used in this course.

24 ECTS / WORK LOAD TABLE

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	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ÖK2	0	4	0	0	0	5	4	0	0	0	0	0	0	0	0	0
ÖK3	0	4	0	0	0	0	4	0	0	0	0	0	0	0	0	0
ÖK4	0	4	0	0	0	4	4	0	0	0	0	0	0	0	0	0
ÖK5	0	0	0	0	0	0	5	0	0	0	0	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**