

ENVIRONMENTAL MICROBIOLOGY

1	Course Title:	ENVIRONMENTAL MICROBIOLOGY
2	Course Code:	CEV2051
3	Type of Course:	Compulsory
4	Level of Course:	First Cycle
5	Year of Study:	2
6	Semester:	3
7	ECTS Credits Allocated:	5.00
8	Theoretical (hour/week):	3.00
9	Practice (hour/week):	0.00
10	Laboratory (hour/week):	2
11	Prerequisites:	
12	Language:	Turkish
13	Mode of Delivery:	Face to face
14	Course Coordinator:	Doç. Dr. ARZU TEKSOY
15	Course Lecturers:	Doç. Dr. Arzu TEKSOY Dr. Öğr. Üyesi Sevil ÇALIŞKAN ELEREN
16	Contact information of the Course Coordinator:	e-mail: alkan@uludag.edu.tr Tel: 0224-2942104 Adres: Bursa Uludağ Üniversitesi Fakültesi Çevre Mühendisliği Bölümü Nilüfer/Bursa, TÜRKİYE Mühendislik
17	Website:	
18	Objective of the Course:	Teaching effective use of related topics of microbiology in the application of technologies for environmental pollution control and monitoring.
19	Contribution of the Course to Professional Development:	
20	Learning Outcomes:	
	1	Student will be able to carry out microbiological analyzes using laboratory techniques.
	2	Student will be able to determine microbial contamination levels in surface water, drinking water, wastewater and sewage sludge samples, and will be able to write a final report by comparing with standards.
	3	Student will be able to use environmental microbiology consciously and effectively to prevent environmental pollution.
	4	Student will have knowledge about the role of microorganisms in the treatment of wastes, improvement of treatment processes, disinfection of drinking water.
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21	Course Content:	
	Course Content:	

Week	Theoretical	Practice		
1	Instruction of the contents of the course, methods of teaching and about activities during semester. Scope of microbiology and nature of microorganisms	General information about environmental microbiology laboratory and the rules during the laboratory study. Presentation of instruments and equipment used in environmental microbiology laboratory. Introducing the microscope. Types of microscope. Informing the students about slide preparation procedures.		
2	Structural organisations of microorganisms, description of procaryotic and eucaryotic cells. Structure of procaryotic cells. Structure of eucaryotic cells. Classification of procaryotic and eukaryotic cells and structure of bacteria	Yeast, fungi and algae. Examination of their structure under microscope.		
3	Classification of bacteria. Structure of algae, protozoa, fungi and viruses, metazoa and higher organisms. Chemical compositions of the cells.	Examination of microorganism by staining and preparation of smear (slide). Pre-applications before staining, and type of stains. Staining methods. Simple staining, differential staining, gram staining, negative staining and endospore staining. Examination of bacteria by using Gram staining method.		
4	Microbial growth. Mathematical definition of microbial growth. Factors affecting microbial growth. Continuous cultures..	Culture media. Media specifications. Preparation of culture media. Microbial growth on nutrient medium. Conservation of microorganisms. Pure culture techniques. The formation of bacterial growth curve.		
5	CEnzymes. Classification of enzymes.	Sampling for microbiological tests and examination.		
Activites		Number	Duration (hour)	Total Work Load (hour)
Theoretical	Observation. Oxidation-reduction potential, electron tower. ATP formation mechanism	plate count (HPC) method	2.00	28.00
Practicals/Labs		14	2.00	28.00
Self study and preparation	Metabolic pathways, respiration, crebs cycle, oxidative phosphorylation, chemiosmosis	14	1.00	14.00
Homeworks		1	2.00	2.00
Projects		0	0.00	0.00
Field Studies		0	0.00	0.00
Midterm Exams	Metabolic diversity.	1	10.00	10.00
Others		1	10.00	10.00
Final Exams		1	25.00	25.00
8	Public health microbiology. Pathogenic and	Estimating the number of conform by multiple tube		
Total Work Load				127.00
9	Microbiological composition of domestic wastewater and its effects on public health	Estimating the number of coliform by multiple tube method		3.00
ECTS Credit of the Course				5.00
10	Disinfection of water and wastewater. Factors affecting disinfection. Methods of disinfection: Chlorine, chlorine dioxide, ozone, UV radiation, photoinactivation methods	Membrane filtration method. Estimating the number of bacteria by membrane filtration method in dirinking water.		
11	Drinking water microbiology. Drinking water treatment processes and drinking water distribution systems. Other biological problems and solutions related to drinking water treatment and distribution.	Estimating the number of E.coli in sludge by pour plate method.		

12	Activated sludge process. Nitrogen, phosphorus, sulfur cycle, Nutrient removal. Suspended growth. Nitrification and denitrification in bioreactors.	Spread plate count. Application of laboratory experimental design.
13	Bulking and foaming in activated sludge plants. The factors that cause filamentous bulking. Control of bulking and foaming. Filamentous bacteria and problems encountered in activated sludge plants.	Examination of activated sludge sample under microscope. Determination of sludge volume index. Application of laboratory experimental design.
14	Sludge microbiology. Sludge processing. Pathogen removal during sludge treatment.	Laboratory: Application of laboratory experimental design.

22	Textbooks, References and/or Other Materials:	1- Alkan U. (2010) Lecture Notes, Uludag Uni., Bursa. 2- Alkan U., Teksoy A., Çalışkan Eleren S. (2008) Laboratory Notes, Uludag Uni., Bursa.
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23	Assesment
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TERM LEARNING ACTIVITIES	NUMBER	WEIGHT
Midterm Exam	1	15.00
Quiz	1	25.00
Home work-project	0	0.00
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		

24	ECTS / WORK LOAD TABLE
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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	4	0	0	0	5	4	4	0	0	0	3	0	0	0	0	0
ÖK2	4	3	0	0	5	4	4	0	0	0	4	0	0	0	0	0
ÖK3	5	0	0	0	0	4	4	0	0	0	4	0	0	0	0	0
ÖK4	3	3	0	0	0	4	4	0	0	0	3	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			