BIOCHEMICAL PROCESSES

1	Course Title:	BIOCHEMICAL PROCESSES	
2	Course Code:	CEV3025	
3	Type of Course:	Compulsory	
4	Level of Course:	First Cycle	
5	Year of Study:	3	
6	Semester:	5	
7	ECTS Credits Allocated:	3.00	
8	Theoretical (hour/week):	2.00	
9	Practice (hour/week):	1.00	
10	Laboratory (hour/week):	0	
11	Prerequisites:		
12	Language:	Turkish	
13	Mode of Delivery:	Face to face	
14	Course Coordinator:	Doç.Dr. AHMET UYGUR	
15	Course Lecturers:	Dr. Berrak Erol NALBUR	
16	Contact information of the Course Coordinator:	(ahmetuygur@uludag.edu.tr, 0 224 294 21 12, Bursa Uludağ Üniversitesi, Mühendislik Fakültesi, Çevre Mühendisliği Bölümü, 16 059 Görükle/Bursa)	
17	Website:	https://sites.google.com/site/docdrahmetuygur/	
18	Objective of the Course:	This course follows about the topics covered are basic, comprehensive and scientific knowledge by giving doctoral students waste and waste water treatment for the biotechnological processes in the field of basic principles and applications of different pollutants in the case of the different processes in the selection delicacy teaching, aiming problems on the combination of solution capabilities will be developed. Environmental engineering, waste and waste water treatment for the biotechnological processes related areas of different concepts, definitions and processes for the solution of mathematical equations for the equality of removal and the problems in a systematic way to solve engineering approach to the development of this course are essential aims.	
19	Contribution of the Course to Professional Development:	By teaching a broad knowledge of biological treatment to the students, they gain many achievements in the design, operation and control of activated sludge systems.	
20	Learning Outcomes:		
		1	Have an understanding of major organisms meeting.
		2	Have the ability to analyze methods and to identify present compounds in wastes
		3	Have the ability of the solving methods of biological degradation and synthesis of present compounds.
		4	Have the ability to solve kinetic equations of enzyme and enzyme inhibitions
		5	Have the ability to solve reaction balance and reaction rates.
		6	Have the ability to design reactor of wastewater treatment and determine mathematical equations of reactor design.
		7	Understand the design and operating parameters in an activated sludge systems.

	8	Have the ability to learn about biological processes in carbon, nitrogen and phosphorus removal.
	9	Have the ability to determine equations of zero-order and first order for activated sludge systems.
	10	Have the ability to design mathematical equations of activated sludge systems with or without recycle. systems. Have the ability how to determine kinetic constants in an activated sludge

21	Course Content:	
	Course Content:	
Week	Theoretical	Practice
1	Introduction-advantages and disadvantages of biological processes	
2	Chemical components of cell	
3	Present compounds in waste	
4	Biological degradation and synthesis of compounds	Practice examples
5	Major organisms in biological wastewater treatment	
6	Composition, characteristics and functions of enzymes; key-lock model, enzyme kinetics; Types of enzyme inhibitions, reversible and irreversible enzyme inhibitions	Practice examples
7	Definition of activated sludge process; Investigation of biological processes in carbon and nitrogen and phosphorus removal	Practice examples
8	Reaction, reaction rate and orders	Practice examples
9	Reactors, reactor rate and classification, main principles of reactor design, solve the practice problems concerning both reaction orders and reactors.	Practice examples
10	Midterm Exam	
11	Description of activated sludge process, aeration and sedimentation tank, energy uses in aerobic and anaerobic systems, yield coefficients; design and operating parameters; determine equations of activated sludge process with or without recycle	Practice examples
12	Design of activated sludge process for zero order and first order kinetics; typical kinetic coefficient values for activated sludge process for domestic wastewaters and heterotrophic bacteria	Practice examples
13	Determine kinetic coefficients of activated sludge process, quiz	Practice examples
14	Solve the practice problems concerning activated sludge process	Practice examples

22	Textbooks, References and/or Other Materials:	Atıksuların Arıtımında Biyokimyasal Prosesler, Prof.Dr. Kadir KESTİOĞLU, Uludağ Üniversitesi Güçlendirme Vakfı Yayını, 2000. Çevre Mühendisliğinde Biyoprosesler, Prof. Dr. Fikret KARGI, D.E.Ü. İzmir, 1995. Wastewater Engineering Treatment and Reuse, George Tchobanoglous, Franklin L. Burton, H. David Stensel, California, 2003
23	Assesment	

TERM LEARNING ACTIVITIES	**NUMBER**	**WEIGHT**
Midterm Exam	1	30.00
Quiz	1	10.00
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		MIDTERM, SHORT EXAM, FINAL EXAM

24 ECTS / WORK LOAD TABLE

Activites	Number	Duration (hour)	Total Work Load (hour)
Theoretical	14	2.00	28.00
Practicals/Labs	14	1.00	14.00
Self study and preperation	14	1.50	21.00
Homeworks	0	0.00	0.00
Projects	0	0.00	0.00
Field Studies	0	0.00	0.00
Midterm exams	1	12.00	12.00
Others	1	3.00	3.00
Final Exams	1	12.00	12.00
Total Work Load			90.00
Total work load/ 30 hr			3.00
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	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

ÖK2	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0
ÖK3	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ÖK4	0	4	5	0	5	0	0	0	0	0	0	0	0	0	0	0
ÖK5	0	4	5	0	5	0	0	0	0	0	0	0	0	0	0	0
ÖK6	0	5	4	0	0	0	0	0	0	0	0	0	0	0	0	0
ÖK7	5	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0
ÖK8	0	5	0	0	4	0	0	0	0	0	0	0	0	0	0	0
ÖK9	5	0	5	0	4	0	0	0	0	0	0	0	0	0	0	0
ÖK10	0	5	4	0	0	0	0	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**