ECTS

(B) Course information in english

General course information:

Course title:	Water Treatment and Principles of Ecological Engineering	**Course code:**	CE07_H06
Credits:	5	**Work load (hours):**	125

Course level:	Undergraduate	☑	Graduate	☐
Course type:	Mandatory	☑	Selective	☐
Course category:	Basic	☐	Orientation	☐

Semester:	7th	**Hours per week:**	4

Course objectives (capabilities pursued and learning results):

The objective of this course is the training of civil engineering students on issues regarding the design and the operation processes used for wastewater treatment plants of both industrial and municipal discharges. Specifically, the students learn the subsequent steps applied during the construction of treatment plants, from the initial design stages up to the final stages of construction. In addition, they learn about the existing legislation and the required guidelines, while their participation in working groups offers them the opportunity to study step by step the progress of each stage. At the end of the semester, the students are able to design a wastewater treatment plant.

Prerequisites:

Instructor's data:

Name:	Chrysi Laspidou
Level:	Associate Professor
Office:	Civil Engineering Faculty University of Thessaly Pedion Areos, 38334 Volos, Greece
Tel. – email:	+30 24210 74147 – laspidou@uth.gr
Other tutors:	-

Specific course information:

Week No.	Course contents	Hours	
		Course attendance	Preparation
1	Origin, quantity and quality of wastewater (BOD, COD, TOC, ThOD, TSS, VSS, N, NO3, NH4, P), Industrial sectors	4	4
2	Elements of Environmental microbiology and biochemistry (microbial cells, bacteria, bio-degradation of organics, cellular production, aerobic-anaerobic, autotrophsheterotrophs)	4	4
3	Biological kinetics Monod kinetics, enzymes, electron donor/acceptor, chemical reaction for the biodegradation of organics and for the production of cells	4	6
4	Bio-reactors Batch, CSTR, plug flow Mass balances: flow-through systems or systems with recirculation	4	6
5	Activated Sludge systems The method overall with its basic design criteria and relevant parameters	4	4
6	Pretreatment-Primary treatment (screening, grit removal, primary sedimentation, flotation)	4	1
7	Secondary treatment (aerobic-anaerobic, activated sludge systems, secondary sedimentation	4	2
8	Activated sludge design (step by step, the design from the beginning to end, calculating biomass concentrations, substrate, microbial products, demands in nutrients and oxygen in every step)	4	6
9	Tertiary treatment (activated carbon adsorption, flocculation, sedimentation,	4	3

	filtration)		
10	Wastewater disinfection and disinfecting agents, Sludge treatment and disposal	4	4
11	Wastewater disposal, reclamation and reuse	4	2
12	Other wastewater treatment systems: attached biomass systems (biofilm), rotating biological contactors, trickling filters	4	2
13	Other wastewater treatment systems: treatment lagoons, constructed wetlands	4	4

Additional hours for:			
Class project	**Examinations**	**Preparation for examinations**	**Educational visit**
		21	

Suggested literature:

Wastewater Engineering: Treatment, Disposal and Reuse, by Metcalf and Eddy,
McGraw Hill.

Environmental Biotechnology: Principles and Apoplications, by B.E. Rittmann and P.L.
McCarty, McGraw Hill, 2001.

Other literature in Greek.

Teaching method *(select and describe if necessary* - **weight***):*		
Teaching	☑	80.....%
Seminars	☐	…….%
Demonstrations	☐	…….%
Laboratory	☐	.....%
Exercises	☑	..20....%

Visits at facilities	If time allows, we visit the local wastewater treatment facility	0%
Other *(describe):* ……	☐	…….%
Total		100%

Evaluation method *(select)*- **weight:**				
	written	*%*	*Oral*	*%*
Homework	☐		☐	
Class project	☐		☐	
Interim examination	☐		☐	
Final examinations	☑	100	☐	
Other *(describe):* ……	☐		☐	