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Department of Chemical Engineering	
Environmental Engineering and its Applications (64483)	
Total Credits	**3**
major compulsory	
Prerequisites	P1 : Unit Operations (64462) OR Unit Operation (64362)

Course Contents

The objective of this course is to deal with different types of pollutants, control and reduce them. Different topics are covered in this course: First: introduction to environmental chemistry (hardness, alkalinity, COD, BOD) and basis of microbiology are covered. Second: The purifications and clarifications of drinking water from ground and surface water, all treatment processes are investigated (pre-treatment, primary treatment and secondary treatment) in this topic. Third: Waste water treatment processes are also considered. Fourth: Air Pollutions problems, dust removal, greenhouse effect.

	Intended Learning Outcomes (ILO's)	Student Outcomes (SO's)	Contribution
1	To apply the fundamental concepts related to water chemistry microbiology, to calculate the main inorganic and organic parameters such as hardness, alkalinity, solid content, EC, major cations, and major anions, BOD, COD, TOC	A	20 %
2	Ability to identify, formulate and solve engineering problems related to drinking water and waste water treatments.	E	20 %
3	Design different facilities needed for drinking water and waste water treatment plants: such as pre-treatment units, settling tanks, coagulation systems, filtration units and disinfection methods	C	30 %
4	Recognize the pollution issues in water and air, and apply techniques needed to control the pollutants to provide safe life for community	H	30 %

Textbook and/ or Refrences

Text book: Gerard Kiely, Environmental Engineering, International edition, 1998, McGraw Hill, ISBN 0-07-116424-3 Reference1: Richard O. Mines, Laura W. Lackey, Introduction to environmental engineering, 2009, ISBN 10: 0-13-234747-4. Reference 2: Mackenzie L. Davis, Water and wastewater engineering design principles and practice, 2011, ISBN 978-007-128924-5.

Assessment Criteria	Percent (%)
First Exam	20 %
Second Exam	20 %
Quizzes	10 %
Final Exam	50 %

Course Plan

Week	Topic
1	Introduction
1_4	ESSENTIAL BACKGROUND TO ENVIRONMENTAL ENGINEERING 1- Introduction to chemistry and microbiology in environmental Engineering, physical and chemical properties of water, hardness and alkalinity of water, organic chemical properties of water, COD, BOD, TOC, atmospheric chemistry, microbiology. /Chapter 3/
5_7	Air pollution, air pollutants, pollution systems, pollutions control systems, acid deposition,

	green house, emission standards, from industrial sources, air pollution metrology / chapter 8/
8_11	ENVIROMENTAL ENGINEERING TECHNOLOGYIES 2- Water treatment: introduction, water treatment processes, pre-treatment of water, Sedimentation, coagulation, flocculation, filtration, disinfection, fluoridation, advanced water treatment process. /Chapter 11/
12_15	3 Waste water treatment: wastewater flow rates and characteristics, design of wastewater network, wastewater treatment process (pre-treatment, primary treatment and secondary treatment), activated sludge systems, nutrient removal, secondary clarification, advanced treatment process, wastewater disinfection, /Chapter 12/
16	Final exam