

Theoretical courses course plan-Illam University of Medical Sciences

Introduction of the course: Industrial wastewater treatment in the second semester of the academic year 2020-2021

School: Health Department: Environmental Health Engineering

Course and degree: Environmental Health - B.Sc.

Day, time and place: Tuesday 8-10

Number and type of theoretical unit 1

Name of the person in charge of the course (course instructor): Ali Nikoonehad

Prerequisite courses:

Office address: School of Health

Phone and contact days: 09188425954

**General purpose of the course:** Familiarity with the types of industrial wastewater, different stages and how to treat industrial wastewater and how to choose the appropriate processes for industrial wastewater treatment.

**Lesson Description:** In general, industrial wastewater is contaminated water that due to various industrial uses and the import of foreign materials, its quality has changed and cannot be used for previous consumption. Industrial wastewater is caused by the use of water in industry and during various stages of production and is sometimes one of the most dangerous types of wastewater. Almost no industry can survive without the use of water, and water consumption, along with waste and overhead, forms effluents and must be properly treated and then disposed of or used. Due to the quality and variety of chemicals used in the effluent pollution industry is very diverse and depends on the industry, for example in the metal industry in the processes of coating metal parts a large amount of effluent contaminated with heavy metals such as copper, Cadmium, silver, mercury, chromium or nickel are produced, which are among the most dangerous pollutants and their genetic and carcinogenic effects have been proven. In the dairy industry, a large amount of soluble fat enters the wastewater from different parts of production and must be separated and removed by special methods. Due to the different industrial effluents, their treatment requires different methods and related expertise. In this course, students are briefly acquainted with various methods of industrial wastewater treatment.

**Specific or partial objectives of the course:** At the end of this course, students can:

- 1- Divide industries in terms of water consumption and wastewater production
- 2- Know and interpret the quantitative and qualitative characteristics of the country's industrial wastewater
- 3- Know the standards of industrial wastewater disposal in Iran

- 4- Know the standards of industrial wastewater disposal in the world
- 5- Know the effects of industrial wastewater disposal on the environment
- 6- Know the regulations of industrial wastewater disposal in the municipal sewage network.
- 7- Know the advantages and disadvantages of industrial wastewater disposal in the municipal sewage n 8- Know the method of wastewater classification.
- 9- Know the method of sewage protection ..
- 10- Know the product change to reduce wastewater
- 11- Know the method of reusing both industrial and municipal effluents
- 12- To know the method of eliminating intermittent and sudden discharges of process effluents
- 13- Know the method of process changes.
- 14- Know the method of changing and modifying the equipment.
- 15- Know the method of wastewater separation.
- 16- Know the method of uniformity of sewage. Network
- 17- Know the method of sewage adaptation
- 18- Know the method of monitoring sewage flows
- 19- Know the method of accidental overflows
- 20- Know the methods of wastewater neutralization
- 21- Know the methods of uniformity and adaptation
- 22- Know the settling methods.
- 23- Know the methods of flotation
- 24- Know the screening methods
- 25- Know the various methods of removing colloidal solids
- 26- Know the various methods of removing mineral solids
- 27- Know the various methods of removing organic soluble solids
- 28- Know the methods of textile, tanning, petrochemical and oil wastewater treatment, sugar making, paper making, food

**Student duties (student homework during the semester):**

- 1- Studying the issues raised in previous meetings
- 2- Asking possible questions about the ambiguities of the previous session
- 3- Participate in class discussion + do class assignments

**The main sources of the lesson:**

- 1- 1 Raufi, Mohammad Kazem- Mallardi, Mohammad Reza- Principles of Water Treatment and Industrial Wastewater- Mobtakaran Publications- Tehran 2002
- 2- Compiled by Aken Felder - Translated by Turkian, Ayub - Jafarzadeh, Mohammad Taghi - Industrial Wastewater Treatment Volume 1- Industrial Towns Company in collaboration with Haft Aseman Publications - Tehran 2001.
- 3- Compiled by Aken Felder - Translated by Turkian, Ayub - Azimi Qalibaf, Ehsan - Industrial Wastewater Treatment Volume 2- Industrial Towns Company in collaboration with Haft Aseman Publications - Tehran 2001.
- 4- Jr. w. wesely- Es kenfeld- 1999- Industrial water pollution control- Mcgraw Hill- New York.
- 5- Nelson Leonard Nemerow- Anijil Dasgupta- 1991- Industrial and Hazardous waste treatment- John wiley.
- 6- Frank Woodard-2001- Industrial waste treatment handbook- Butter worth heine Maun

Teaching method + teaching aids used: video projector, computer and internet, educational articles, Powerpoint

**Methods and time of assessment and evaluation of the student and the bar related to each evaluation:**

- Class question 2 points + quiz 3 points + end-of-semester exam 15 points (changes may occur if the coronary conditions continue)

**Lesson rules and expectations from students**

**Schedule and predicted contents of each theory session**

Session	Topic	Necessary preparation of students before the start of the class
1	1- Division of industries 2- Quantitative characteristics and quality of industrial wastewater 3- Industrial wastewater disposal standards	Timely attendance at class Asking possible questions about the lesson
2	1- Methods of reducing the volume of industrial	Study the contents of the

	wastewater 2- Disposal of industrial effluents in the urban sewerage network	previous session lesson Timely attendance at class Asking possible questions about the ambiguities of the previous lesson
3	Methods for reducing the concentration of industrial wastewater	
4	Methods of pre-treatment of industrial wastewater	
5	Methods for removal of suspended solids and gases	
6	Methods for removal of colloidal solids and soluble inorganic and organic solids	
7	Specific methods of wastewater treatment in some industries	
8	A variety of AOP methods in advanced industrial wastewater treatment	
9	The role of filtration types (MF, UF, NF, RO) in industrial wastewater recycling	