

Theoretical and practical courses

Ilam University of Medical Sciences

Introduction of the course: Design and principles of waste systems engineering for the second semester of the academic year 2020-2021

School: Health Department: Environmental Health Engineering

Course and degree: M.Sc.

Day, time and place: Monday 4-14 pm

Department of Environmental Health

Number and type of unit (theoretical): 2

names of the person in charge of the course (teacher): Dr. Ali Amarloui

Prerequisite courses: No Office address: School of Health

Phone and contact days: 09188424818

Email: amarloei@yahoo.com

General Objective of the course: At the end of this course, the student will be able to work in the field of design, maintenance and operation of these systems by reviewing all the steps of solid waste management and the elements required for it and using methods, technologies and programs. N.

Lesson Description: Accurate identification of solid waste management system and the elements required in this system, including the stages of production, storage, collection, transportation, recycling, processing, treatment and final disposal are considered. This course deals with the subject of design, maintenance and operation according to technical points.

Specific or partial objectives of the course:

1- Origin, composition and characteristics of municipal solid waste: physical, chemical and biological

2- Calculations related to waste and waste formulation score

3- Solid waste collection: Waste collection methods (SCS-HCS systems, related components and their economic analysis)

4- Methodology for selecting landfills for solid waste

5- Waste landfill: Engineering principles in designing the method of hygienic landfilling of waste (collection and calculation of produced gases and leachate treatment)

6- Waste incinerator technology: types, design principles and calculations of the amount of gases produced

7- Production of compost from municipal solid waste: Principles and bases of design of compost systems

8- Management of hazardous household waste

9- Energy production through incineration of solid waste: emission control and ash management

10- Solid waste management in health centers

Student duties (student homework during the semester):

- 1- Due to the fact that three sessions of the class are to be run on a student-centered basis, topics from the course topic will be divided among the students. It is necessary for each student to coordinate the materials related to the desired session with the teacher up to 10 days before the class and provide a copy of the prepared materials to other students so that other students are ready to participate in the class discussion. The readiness of the presenter and the syntax of other people's participation in the discussion are evaluated and scored.
- 2- The student is obliged to be prepared in each session to answer the questions related to the previous sessions in written and oral form.
- 3- Preparing visit reports and diagnosing and expressing problems and presenting scientific and practical solutions

Main sources of the course) Main sources by observing the principles of source writing and giving an address for their preparation, including library, bookstore, internet and:

1- Landreth R. E., Rebers P. A., "Municipal solid waste: problem and solution", CRC press. last edition.

2- John Pitchte, Waste Management practices: Municipal, hazardous, and industrial, second edition, CRC press, 2014.

3-WHO, "Safe Management of Wastes from health-care facilities", last Edition

Teaching methods + teaching aids used:

Questions and answers and then present the lesson using PowerPoint, Overhead and Whiteboard. Three sessions of the course are student-centered. In a practical discussion, we will plan to visit the Ilam landfill, the site for the disposal of infectious waste, as well as the landfill and the compost factory in Kermanshah. In coronary conditions, lessons are organized virtually or in person based on protocols.

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

- 1- Holding a written test of the presented materials: 13 points
- 2- Presenting a lecture in connection with one of the course topics: 3 points
- 3- Exam and questions and answers of the class: 2 points
- 4- Submission of visit report: 2

Lesson rules and expectations from students:

- 1- The active participation of the student along with observing the relevant order and principles, respecting the manners of the class and other students, as well as the correct use of teaching aids and materials are essential.
- 2- The presence of students in extraordinary classes is essential. The time of the mentioned classes will be informed in advance to the representative of the class and the education department of the faculty.
- 4- According to the current regulations of the university, absence from more than 4 sessions of the classroom is not allowed. Obviously, this figure also includes justified absence.

Schedule and anticipated provisions of each session

Session	Time	Topic	Necessary preparation
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			of students before the start of the class
1	14-16	Introduction and knowledge of students' scientific status regarding the subject, introduction and objectives of this course, course title, teaching and evaluation, resources used, review of definitions of waste and their classification, sources of production and health and economic importance of waste Solid in different communities	
2		Elements required in solid waste management (general), important parameters in solid waste collection and disposal projects	Written and oral questions and answers from the material presented in previous sessions
3		Physical, Chemical and Biological Properties of Solid Waste - Waste Sampling Methods and Required Equipment - Solid Waste Production	
4		Ways to reduce solid waste in urban communities and its importance - processing and recycling, how it works and its criteria	
5		Collection and transportation of solid waste (up to temporary location)	
6		Collection and transportation of solid waste (from temporary onwards)	
7		Different methods of solid waste disposal (dumping, burial) - advantages, disadvantages and calculation of landfill space as well as landfill selection	
8		Engineering principles in designing a hygienic landfill method (calculating the required space and principles of landfill selection)	
9		Landfill technologies, completion and maintenance of sanitary landfill - control of leachate and gases in the landfill and biochemical reactions in the landfill, calculations of gases produced	
10		Preparation of compost (advantages and disadvantages, economic and health importance, effective parameters) and reactions in compost	
11		Different methods of compost preparation (reactor and non-reactor surface methods)	
12		Preparation of compost fertilizer by pond method - Important parameters in determining the appropriate method and technology for making compost fertilizer - Use of compost fertilizer in agriculture	
13		Waste incinerator technology: types, design principles and calculations of the amount of gases produced	
14		Energy production through solid waste incineration: emission control and ash management	
15		Hazardous household waste management, solid waste management in health centers	
16		Visit	

17		End of semester exam	
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