

## **Theoretical and practical courses**

### **Ilam University of Medical Sciences**

Introduction of the course: Analysis and evaluation of air samples in the second semester of the academic year 2020-2021

School: Health Department: Occupational Health Engineering

Course and degree: Bachelor of Occupational Health Day

Time and place: Wednesday 8-10

Number and type of unit (theoretical): 2 theoretical units - 1 practical unit

Name of course manager (course instructor): Dr. Shiva Souri

Prerequisite courses: Decomposition Chemistry, Basics of Pollutant Sampling

Office Address: School of Health

Phone and contact days: Saturday to Wednesday – 32235717

**Overall Objective of the Lesson:** The ability to quantitatively measure the density of air pollutants in order to assess chemical risks

**Lesson Description:** How to analyze and evaluate samples prepared from workplace air

**Specific or partial objectives of the course:**

- 1- Comprehensive familiarity with the principles of sample preparation
- 2- Comprehensive familiarity with making standard solutions and drawing calibration curves
- 3- Comprehensive familiarity with determining the density of air pollutants with optical spectrometer (spectrophotometer)
- 4- Comprehensive familiarity with determining the density of air pollutants with atomic spectrometers
- 5- Comprehensive familiarity with determining the density of air pollutants by chromatographic method
  
- 6- Comprehensive familiarity with determining the density of air pollutants by titration and gravimetric methods

- 7- Comprehensive familiarity with determining the density of air pollutants by counting method
- 8- Comprehensive familiarity with reviewing and analyzing data and analysis findings
- 9- Comprehensive familiarity with the criteria and criteria for evaluating the results
- 10- Comprehensive familiarity with comprehensive familiarity with determining the density of air pollutants with atomic absorption spectrometer

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

- 1- The student is obliged to be prepared in each session to answer the questions related to the previous sessions in written and oral form.
- 2- Active participation in the class

The main sources of the lesson:

- 1- Bahrami Abdolrahman, Sampling and Analysis of Air Pollutants, Volumes 1, 2 and 3
- 2- Guide for identification and evaluation of chemical harmful agents, Workplace Health Center
- 3- Stern MB, Application and Computational Elements Industrial Hygiene, Last edition
- 4- Skoog and West, Principle of Instrumental Analysis

**Teaching methods + teaching aids used:**

Lectures, discussions, questions and answers, PowerPoint, use of magic and whiteboard

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

- Homework, class activities, evaluation during the semester and conference ۲ score, midterm ۳ score, end-of-term exam ۴ score, total ۵ score

**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	Different methods of preparing air samples	Methods of preparation of air samples collected by surface adsorbents (chemical, thermal, ultrasonic and microwave methods)
2	Different methods of preparing air samples	

		Methods of preparation of air samples collected in the impinger (counting and chemical methods)
3	Different methods of preparing air samples	Methods of preparation of air samples collected by the filter (digestion, soxhlet, solvent washing, smoothing, dry ash, and clarification methods)
4	Construction of standard solutions and drawing of calibration curves	Method of making standard solutions (mother, middle and applied) and drawing various types of calibration curves
5	Determination of air pollutant density with optical spectrophotometer	Basic concepts of absorption and emission spectra and Beer Lambert relationship and various UV-VIS spectroscopy methods
6	Determination of air pollutant density with atomic spectrometers	Atomic absorption and emission spectrometers
7	Determination of air pollutant density with atomic absorption spectrometer	Atomic Absorption Spectroscopy Methods of Furnace, Furnace, Hydrid Generation and Cold Vapor
8	----- Midterm exam -----	
9	Determination of air pollutant density by chromatographic method	Basic concepts of chromatography) gas and liquid
10	Introduction of chromatographic devices	Familiarity with GC, HPLC and Chromatograph Ion devices and their application in determining the density of air samples
11	Determination of air pollutant density by titration and gravimetric methods	Volumetric and gravimetric methods in determining the density of air samples
12	Determination of air pollutant density by counting method	Microscopic examination methods for counting, determining the dimensions of particles and fibers in air

		samples and introducing different types of graticules and microscope calibration
13	Review and analysis of data and analysis findings	Validation methods and quality control of analysis results (types of errors, accuracy, precision, bias, coefficient of variation, etc.)
14	Criteria and criteria for evaluating the results	Interpretation of results in normal and unconventional encounters (unusual work shifts)
15	Criteria and criteria for evaluating the results	Interpretation of results in exposure to a mixture of chemical contaminants
16	----- End of semester exam -----	

**Practical work programs in the laboratory:**

- 1- Sampling, preparation and analysis of a compound by titration method
- 2- Sampling and analysis of a chemical compound by spectrophotometric method
- 3- Sampling, preparation and analysis of a volatile compound with the help of surface adsorbent and analysis by case chromatography
- 4- Preparing a sample prepared with a gas bottle and decomposing it with the help of liquid chromatography device with excellent performance
- 5- Preparing a sample prepared from a metal compound with a filter and decomposing with the help of an atomic absorption device
- 6- Microscope calibration, filter clarification and asbestos fiber counting
- 7- Preparing a standard solution of quartz and how to fix it on a silver filter