Theoretical and practical courses-Ilam University of Medical Sciences

Introduction to the course: Microbiology of the environment in the second semester of the academic year 1300-1499

School: Health

Department: Environmental Health Engineering

Course and degree: Continuing bachelor's degree

Day, time and place: Theory Tuesday 16-14 hours - Practical Saturday 12-8 Az. Environmental Microbiology

Number and type of unit (theoretical / practical): 1/1

Name of the person in charge of the course (lecturer): Dr. Ali Amarloui

Prerequisite courses: General Microbiology

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General purpose of the lesson:

Familiarity of students with environmental microorganisms, knowledge of pathogenic microorganisms and saprophytes, familiarity with the principles and foundations of applied microbiology and its role in controlling and purifying environmental pollutants

Specific or partial objectives of the course:

1- Familiarity of students (review) with microbiology and microbiology of the environment and how to classify microorganisms

2- Familiarity of students with bacteria, algae, fungi, protozoa, worms and viruses in the environment and their control methods

3- Familiarity of students with the chemical composition of cells and the main pathways of metabolism and control of metabolic reactions

4- Familiarity of students with the principles of application of microbiology in the environment

5- Familiarity of students with the theory of biological treatment in biological wastewater treatment systems

In the practical part of the course, the student should be able to:

6- Sampling water, sewage and air for microbial tests.

7- To prepare all kinds of culture media used in microbial tests of water, sewage and air.

8- Perform routine bacterial tests to control the quality of drinking water.

9- Examine and identify algae, fungi, etc. important in the environment.

10- Interpret the results of microbial tests.

Student duties (student homework during the semester):

1- The student is obliged to have the necessary preparation in each session to answer the questions related to the previous sessions in written and oral form.

2- In the practical part, the student is obliged to participate in an extraordinary meeting after the incubation period to see the results of the experiments and their interpretation. Otherwise an absence session will be scheduled.

3- Preparing laboratory work report for each session

The main sources of the lesson:

1- Gabriel Beaton, translated by Seyed Hassan Mir Hindi, Mahnaz Nikayin, Waste Microbiology, Tehran University of Medical Sciences, 2004

2- Gholami Mitra, Mohammadi Hamed, Microbiology of Water and Wastewater, Hayan Publishing Culture Institute Publications

3- APHA, AWWA, WEF (2012) "Standard Methods for the Examination of Water and Wastewater". 22nd edition, USA.

4- Pepper Ian L, Gerba Charles P (2004), Environmental Microbiology (a laboratory manual), second edition, Elsevier.

4- 5- Pepper Ian L, Gerba Charles P, Gentry Terry J (2014), Environmental Microbiology, third edition, Academic Press.

6- Volodymyr Ivanov (2015), Environmental Microbiology for Engineers, second edition, CRC press.

Other Persian books available related to the chapters:

1- Microbiology of water and sewage Mitra Gholami, Hamed Mohammadi

2- Applied Microbiology of Water and Wastewater by Dr. Gagik Badlians Gholi Kennedy

3- Microbial tests of water and effluent of Dr. Giti Emtazi

4- Water quality guidelines, first volume, translated by Ramin Nabizadeh ...

5- National Standard of Iran 5868 Water - Identification and counting of fungi

6- National Standard of Iran 3140 Method of identification and counting of Pseudomonas

7- National Standard of Iran 5870 Identification and counting of sulfate reducing bacteria

8- Iranian National Standard 6859 Water - Search and identification of iron bacteria

9- National Standard of Iran 7023 Water - Search and identification of cyanobacteria

10- National Standard of Iran 3619 Search and identification of fecal streptococci

11- National Standard of Iran 6987 Water - Identification and counting of Giardia and ...

12- National Standard of Iran 8789 Water Quality - Identification of Salmonella species

13- National Standard of Iran 3759 Search and count of coliforms in water by multi-pipe method

14- National Standard of Iran 7024 Water - Search and identification of bacteriophages

15- National Standard of Iran 7223 Water - Vibrio Chlorine Search and Counting

16- National Standard of Iran 5860 Water - Search and identification of Giardia Lamblia

17- National Standard of Iran 7067 Water - Search and identification of Entamba histolytica

18- National Standard of Iran 6377 Water - Search and identification of release protozoa

Teaching methods + teaching aids used:

Questions and answers about the material presented in previous sessions and written or oral exams. Teaching method is implemented in the form of lectures, questions and answers and group discussions in the form of critical thinking using the facilities of appropriate educational technology (PowerPoint, Overhead and White).

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

Theoretical part:

Written or oral questions and answers in each session and participation in class programs 4 points

End-of-semester exam 16 points

Practical part:

-Laboratory report for each session 2 points

-Written or oral questions and answers and participation in the laboratory 3 points

-Practical exam at the end of the semester in writing 10 points

-Practical exam at the end of the semester in practice 5 points

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 materials and teaching aids 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.

3- According to the current regulations of the university, absence from the classroom for more than 4.17 sessions is not allowed. Obviously, this figure also includes justified absence.

Schedule and predicted provisions in each theoretical session

Session	Time	Topic	Necessary preparation of students

			before the start of the class
1	8-10	Introduction and knowledge of students' knowledge about the subject, introduction and objectives of this course, presentation of the course title, teaching method and evaluation, resources used, definition of environmental microbiology, domains and applications of environmental microbiology and important microorganisms in the environment, structure Cellular and properties of microorganisms, types of their classification and comparison with each other	
2		Classification of prokaryotes, their importance and control in the environment (bacteria present in water, bacterial diseases related to water and sewage, harmful bacteria in water and sewage and their control)	Written and oral questions and answers from the material presented in the previous sessions and the necessary preparation to participate in the topics presented in the class
3		Continue the discussion of the classification of prokaryotes, their importance and control in the environment, the classification of eukaryotes related to water and wastewater (protozoa and worms), their importance and control in the environment	
4		Algae, identification, positive and negative characteristics and their control	
5		Fungi in the environment, positive and negative characteristics and their control	
6		Viruses transmitted by water and sewage	
7		Metabolism in microorganisms, Main metabolic pathways, Aerobic metabolism, Anaerobic metabolism	
8		Metabolic classification of microorganisms, growth of microorganisms and factors affecting it	
9		Microbial and chemical indices of water pollution, principles of microbiology application in the environment, theory of biological treatment in biological treatment systems of activated sludge, drip filter, stabilization ponds and anaerobic biological treatment systems	
10		End of semester exam	

Schedule and predicted provisions in each theoretical session

Session	Time	Topic	Necessary preparation of students before the start of the class
1	8-10 10-12	Introduction and knowledge of students' knowledge about the subject, introduction and objectives of this course, course title, teaching and evaluation, resources used, how to write a laboratory work report, regulations and safety in the laboratory, water and sewage sampling for tests Microbial (principles of sampling, site selection and sampling frequency)	
2		Sampling equipment and how to prepare it, sampling methods from different sources, methods of sterilizing	Written and oral questions and answers from the material

		equipment and materials in the laboratory, tests for microbial quality of drinking water	presented in the previous sessions and the necessary preparation to participate in the topics presented in the class
3		Familiarity with laboratory equipment, tap sampling	
4		Total bacterial count (HPC) test and familiarity with membrane filtering method	
5		Multi-tube coliform test (probable stage)	
6		Multi-tube coliform test (confirmation step)	
7		Testing of coliforms by multi-tube method (first supplementary stage)	
8		Testing of coliforms by multi-tube method (second supplementary stage), preparation of culture medium	
9		Examination of coliforms by multi-tube method (third supplementary stage), smear preparation and hot staining	
10		Diagnostic Tests for Coliforms (IMVIC)	
11		P / A test	
12		Microbial biopsy of the air to check for bacteria and fungi in the air	
13		Methods and principles of examining fungi in the air and preparing culture slides	
14		Lactophenol staining of ketone blue to identify and identify fungi	
15		Algae, their detection and observation of samples of algae, rotifers, Paramisium, , some worms and larvae in water and sewage	
16		Growth inhibitory concentration (MIC) and minimum lethal dose (MBC) tests for peripheral saprophytic bacteria	
17		End of semester exam	