

Department : **Clinical Laboratory Sciences**
Course Number : **CLS 416**
Course Title : **Environmental Microbiology**
Credit Hours : **1 + 1 = 2**

Course Description:

This course is designed to provide the students with an understanding of the vital activities that microorganisms perform in nature and in the broader dimension of organic activities in the total ecosystem. Students will learn about the useful and harmful roles of microorganisms in the food and dairy industries. The use of microorganisms in industrial processes, the treatment of waste materials and microbial quality controls will also be discussed.

CLS 416: Lectures Outline

Weeks	Subjects
1.	Fundamentals of microbial ecology- Characteristics of microbial ecosystems, microorganisms and their ability to cause changes; Adaptation
2.	Microbial symbiosis: Neutralism, mutualism, comensalism, antagonism, competition, parasitism and predation
3.	Epidemiology of infectious diseases: Terminology, disease reservoirs, modes of transmission, and public health measures for the control of epidemics
4.	Epidemiology of zoonotic diseases: Viral, bacterial, and parasitic zoonoses; prevention and control of zoonotic diseases
5.	Air Microbiology – Indoor and outdoor air, airborne diseases and its transmission, control of microorganisms in the air
6.	Water Microbiology – Water sources, microbial content of water, pollution of water
7.	Environmental sanitation: Types of sewer lines, treatment of sewage, sewage transmitted diseases
8.	Microorganisms involved in the spoilage of different types of food and milk
9.	Microorganisms involved in the spoilage of food continued ... Food borne diseases: Infection, intoxication;
10.	Food borne diseases continued ... Infection, intoxication; prevention and control of food borne diseases

11. Nosocomial infections: Predisposing factors, endogenous and exogenous infections, sources, control measures
12. Laboratory acquired infections: Classification of organisms into Risk groups, safety precautions when handling each Risk group, hazardous laboratory techniques and processes
13. Microbial production processes: Characteristics of microbial fermenters, different types of microbial processes – dairy, pharmaceutical, single cell protein

CLS 416: Laboratory Schedule

Weeks	Subjects
1.	Microorganisms in the air Air sampling – Indoors / outdoors, exposure plates, different duration of exposures
2.	Aerosols : Bacteriological laboratory techniques that create aerosols, sneeze effect
3.	Environmental sampling from surfaces – Rodac plate, swab
4.	Examination of water – Recreational water, drinking water Microbial analysis of water – Most Probable Number
5.	Microbial analysis of water continued ... Millipore filter technique
6.	Microbial analysis of milk – Standard plate count
7.	Microbial analysis of milk continued ... Reductase test, Phosphatase test, Brucella Ring test
8.	Food spoilage microbiology: Enumeration of food spoilage organisms (some fruits and vegetables)
9.	Estimation of viable count of microbial flora in meat and meat by-products
10.	Estimation of coliforms counts in meat and meat by-products
11.	Isolation of pathogens in foods
12.	Food poisoning continued ... identification methods of isolated pathogens
13.	Revision
14.	FINAL PRACTICAL EXAMINATION

Assessments:

First Mid Term Examination:	15
Second Mid Term Examination:	15
Laboratory Quizzes:	5
Mid Term Practical Examination:	5
Final Practical Examination:	20
Final Theoretical Examination:	40

References:

1. Eugene W. Nester et al., **Microbiology-A Human Perspective**, Mac Graw Hill, USA. Latest Edition
2. Tortora, G. J., B. R. Funke, and C. L. Case. **Microbiology, An Introduction**. (7th edition) Benjamin Cummings, San Francisco, 2002
3. Cano J. Raoul and Calome J.S., **Microbiology**, West Publishing Company, USA, Latest Edition