

COURSE TITLE	APPLIED MICROBIOLOGY AND INFECTION CONTROL INCLUDING SAFETY
COURSE CODE	20BN0301
COURSE CREDITS	3

Objective:

- 1 1. Identify the ubiquity and diversity of microorganisms in the human body and the environment. 2. Classify and explain the morphology and growth of microbes. 3. Identify various types of microorganisms.
- 2 4. Explore mechanisms by which microorganisms cause disease. 5. Develop understanding of how the human immune system counteracts infection by specific and non-specific mechanisms.
- 3 6. Apply the principles of preparation and use of vaccines in immunization. 7. Identify the contribution of the microbiologist and the microbiology laboratory to the diagnosis of infection.
- 4 1. Develop knowledge and understanding of Hospital acquired Infections (HAI) and effective practices for prevention. 2. Integrate the knowledge of isolation (Barrier and reverse barrier) techniques in implementing various precautions. 3. Demonstrate and practice steps in Hand washing and appropriate use of different types of PPE. 4. Illustrate various disinfection and sterilization methods and techniques.
- 5 5. Demonstrate knowledge and skill in specimen collection, handling and transport to optimize the diagnosis for treatment. 6. Incorporate the principles and guidelines of Bio Medical waste management. 7. Apply the principles of Antibiotic stewardship in performing the nurses' role. 8. Identify patient safety indicators and perform the role of nurse in the patient safety audit process.
- 6 9. Apply the knowledge of International Patient Safety Goals (IPSG) in the patient care settings. 10. Identify employee safety indicators and risk of occupational hazards. 11. Develop understanding of the various safety protocols and adhere to those protocols.

Course Outcomes: After completion of this course, student will be able to:

- 1 Explain concepts and principles of microbiology and its importance in nursing, Describe structure, classification morphology and growth of bacteria, Identify Microorganisms
- 2 Describe the different disease producing organisms
- 3 Explain the concepts of immunity, hyper sensitivity and immunization
- 4 Summarize the evidence based and effective patient care practices for the prevention of common healthcare associated infections in the healthcare setting , Demonstrate appropriate use of different types of PPEs and the critical use of risk assessment, Demonstrate the hand hygiene practice and its effectiveness on infection control, Illustrates disinfection and sterilization in the healthcare setting.
- 5 Illustrate on what, when, how, why specimens are collected to optimize the diagnosis for treatment and management. Explain on Bio Medical waste management & laundry management, Explain in detail about Antibiotic stewardship, AMR, Describe MRSA/ MDRO and its prevention.

Course Outcomes: After completion of this course, student will be able to:

- 6 Enlist the patient safety indicators followed in a health care organization and the role of nurse in the patient safety audit process, Captures and analyzes incidents and events for quality improvement, Enumerate IPSCG and application of the goals in the patient care settings. Enumerate the various safety protocols and its applications, Explain importance of employee safety indication, Identify risk of occupational hazards, prevention and post exposure prophylaxis.

Pre-requisite of course: This course is designed to enable students to acquire understanding of fundamentals of Microbiology, compare and contrast different microbes and comprehend the means of transmission and control of spread by various microorganisms. It also provides opportunities for practicing infection control measures in hospital and community settings.

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
2	0	2	75	15	10	0	0

Contents : Unit	Topics	Contact Hours
1	Introduction to microbiology Importance and relevance to nursing, Historical perspective, Concepts and terminology, Principles of microbiology	3
2	General characteristics of Microbes: Structure and classification of Microbes, Morphological types, Size and form of bacteria, Motility, Blood and body fluids, Laboratory methods for Identification of Microorganisms, Types of Staining – simple, differential (Gram’s, AFB), special – capsular staining (negative), spore, LPCB, KOH mount., Culture and media preparation – solid and liquid. Types of media – semi synthetic, synthetic, enriched, enrichment, selective and differential media. Pure culture techniques – tube dilution, pour, spread, streak plate. Anaerobic cultivation of bacteria	20
3	Pathogenic organisms Micro-organisms: Cocci – gram positive and gram negative; Bacilli – gram positive and gram negative, Viruses, Fungi: Superficial and Deep mycoses, Parasites, Rodents & Vectors, Characteristics, Source, portal of entry, transmission of infection, Identification of disease producing micro-organisms	10
4	Immunity Immunity: Types, classification, Antigen and antibody reaction, Hypersensitivity reactions, Serological tests, Immunoglobulins: Structure, types & properties, Vaccines: Types & classification, storage and handling, cold chain, Immunization for various diseases, Immunization Schedule	7

Contents : Unit	Topics	Contact Hours
5	HAI (Hospital acquired Infection) Hospital acquired infection ? Bundle approach - Prevention of Urinary Tract Infection (UTI) - Prevention of Surgical Site Infection (SSI) - Prevention of Ventilator Associated events (VAE) - Prevention of Central Line Associated Blood Stream Infection (CLABSI), Surveillance of HAI – Infection control team & Infection control committee	4
6	Isolation Precautions and use of Personal Protective Equipment (PPE) Types of isolation system, standard precaution and transmission-based precautions (Direct Contact, Droplet, Indirect), Epidemiology & Infection prevention – CDC guidelines, Effective use of PPE	7
7	Hand Hygiene Types of Hand hygiene. ? Hand washing and use of alcohol hand rub, Moments of Hand Hygiene, WHO hand hygiene promotion	3
8	Disinfection and sterilization Definitions ? Types of disinfection and sterilization, Environment cleaning ? Equipment Cleaning, Guides on use of disinfectants ? Spaulding’s principle	3
9	Specimen Collection (Review) Principle of specimen collection ? Types of specimens ? Collection techniques and special considerations, Appropriate containers ? Transportation of the sample ? Staff precautions in handling specimens	1
10	BMW (Bio Medical Waste Management) Laundry management process and infection control and prevention, Waste management process and infection prevention ? Staff precautions ? Laundry management, Country ordinance and BMW National guidelines 2017: Segregation of wastes, Colour coded waste containers, waste collection & storage, Packaging & labeling, Transportation	4
11	Patient Safety Indicators Care of Vulnerable patients ? Prevention of Iatrogenic injury ? Care of lines, drains and tubing’s ? Restrain policy and care – Physical and Chemical, Blood & blood transfusion policy ? Prevention of IV Complication ? Prevention of Fall ? Prevention of DVT, Shifting and transporting of patients ? Surgical safety, Care coordination event related to medication reconciliation and administration ? Prevention of communication errors ? Prevention of HAI ? Documentation, Incidents and adverse Events ? Capturing of incidents ? RCA (Root Cause Analysis), CAPA (Corrective and Preventive Action), Report writing	8
12	IPSG (International Patient safety Goals) Identify patient correctly ? Improve effective communication ? Improve safety of High Alert medication, Ensure safe surgery ? Reduce the risk of health care associated infection, Reduce the risk of patient harm resulting from falls ? Reduce the harm associated with clinical alarm system	1

Contents : Unit	Topics	Contact Hours
13	Safety protocol 5S (Sort, Set in order, Shine, Standardize, Sustain) ? Radiation safety ? Laser safety, Fire safety - Types and classification of fire - Fire alarms - Firefighting equipment, HAZMAT (Hazardous Materials) safety - Types of spill - Spillage management - MSDS (Material Safety Data Sheets), Environmental safety - Risk assessment - Aspect impact analysis - Maintenance of Temp and Humidity (Department wise) - Audits, Emergency Codes, Role of Nurse in times of disaster	5
14	Employee Safety Indicators Vaccination ? Needle stick injuries (NSI) prevention, ? Fall prevention ? Radiation safety ? Annual health check, Occupational health ordinance ? Vaccination program for healthcare staff ? Needle stick injuries and prevention and post exposure prophylaxis	2
15	Antibiotic stewardship Importance of Antibiotic Stewardship ? Anti-Microbial Resistance, Prevention of MRSA, MDRO in healthcare setting	2
Total Hours		80

Textbook :

- 1 Applied microbiology and infection control including safety, Pooja Gupta, VHS publisher, 2023
- 2 Textbook of Applied Microbiology and infection control including safety, I Clement, Jaypee publisher, 2024

References:

- 1 Textbook of Applied Microbiology including safety, Textbook of Applied Microbiology including safety, Anju dhir, CBS publisher, 2022

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery					
Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking / Creative
14.00	36.00	20.00	20.00	5.00	5.00

Instructional Method:

- 1 Only Theory

Supplementary Resources:

1 N/A