

# **Essentials of Applied Microbiology for NURSES *Including* *Infection Control and Safety***

## **Essentials of Applied Microbiology for NURSES *Including Infection Control and Safety***

**Apurba S MD (JIPMER) DNB MNAMS PDCR Sastry, Officer In-charge, Hospital  
Infection Control and Prevention Unit (HICP) Antimicrobial Stewardship  
Lead Additional Professor Department of Microbiology Jawaharlal Institute  
of Postgraduate Medical Education and Research (JIPMER) Puducherry,  
Sandhya (Gold medalist) MD DNB MNAMS PDCR Bhat, *Professor*  
Department of Microbiology Pondicherry Institute of Medical  
Sciences (PIMS) (A Unit of Madras Medical Mission) Puducherry,**

---

# **Essentials of Applied Microbiology for NURSES *Including Infection Control and Safety*: Essentials of Applied Microbiology for NURSES *Including Infection Control and Safety***

by Apurba S MD (JIPMER) DNB MNAMS PDCR Sastry and Sandhya (Gold medalist) MD DNB MNAMS PDCR Bhat

*As per the Revised INC Syllabus for BSc Nursing*



**JAYPEE BROTHERS MEDICAL PUBLISHERS**

*The Health Sciences Publisher*

New Delhi | London



**Jaypee Brothers Medical Publishers (P) Ltd**

*Headquarters*

Jaypee Brothers Medical Publishers (P) Ltd

EMCA House, 23/23-B

Ansari Road, Daryaganj

New Delhi 110 002, India

Landline: +91-11-23272143, +91-11-23272703

+91-11-23282021, +91-11-23245672

Email: <jaypee@jaypeebrothers.com>

*Corporate Office*

Jaypee Brothers Medical Publishers (P) Ltd

4838/24, Ansari Road, Daryaganj

New Delhi 110 002, India

Phone: +91-11-43574357

Fax: +91-11-43574314

Email: <jaypee@jaypeebrothers.com>

*Overseas Office*

J.P. Medical Ltd

83 Victoria Street, London

SW1H 0HW (UK)

---

Phone: +44 20 3170 8910

Fax: +44 (0)20 3008 6180

Email: <info@jpmepub.com>

Website: www.jaypeebrothers.com

Website: www.jaypeedigital.com

© 2022, Jaypee Brothers Medical Publishers

The views and opinions expressed in this book are solely those of the original contributor(s)/author(s) and do not necessarily represent those of editor(s) and Publisher of the book.

All rights reserved. No part of this publication may be reproduced, stored or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without the prior permission in writing of the publishers.

All brand names and product names used in this book are trade names, service marks, trademarks or registered trademarks of their respective owners. The publisher is not associated with any product or vendor mentioned in this book.

Medical knowledge and practice change constantly. This book is designed to provide accurate, authoritative information about the subject matter in question. However, readers are advised to check the most current information available on procedures included and check information from the manufacturer of each product to be administered, to verify the recommended dose, formula, method and duration of administration, adverse effects and contraindications. It is the responsibility of the practitioner to take all appropriate safety precautions. Neither the publisher nor the author(s)/editor(s) assume any liability for any injury and/or damage to persons or property arising from or related to use of material in this book.

This book is sold on the understanding that the publisher is not engaged in providing professional medical services. If such advice or services are required, the services of a competent medical professional should be sought.

Every effort has been made where necessary to contact holders of copyright to obtain permission to reproduce copyright material. If any have been inadvertently overlooked, the publisher will be pleased to make the necessary arrangements at the first opportunity.

Inquiries for bulk sales may be solicited at: <jaypee@jaypeebrothers.com>

**Essentials of Applied Microbiology for Nurses Including Infection Control and Safety**

*First Edition: 2022*

*Printed at:*

---

# Dedicated to

**Our Beloved Parents, Family Members**

*And, above all, the Almighty*

---

# Table of Contents

Become an Infection Control Nurse .....	iii
Golden Rules of Goal Setting .....	iv
Preface .....	vi
ACKNOWLEDGMENTS .....	ix
INC SYLLABUS .....	xi
SECTION B: INFECTION CONTROL and SAFETY .....	xv

---

# Become an Infection Control Nurse

- Pursue a career as an infection control nurse—a highly demanding and specialized area.
- Infection control nurses are the pillar behind the implementation of infection control activities in healthcare facilities.
- Have in-depth knowledge of Microbiology and infection control to prevent cross-transmission of organisms in hospital.



---

# Golden Rules of Goal Setting

## Dear Students

Here are some important tips which will help you in setting your goals in studies:

1. Set Goals That Motivate You: This means making sure that they are important to you, and that there is value in achieving them
2. Set SMART Goals
  - Specific: Your goal must be clear and well defined, not vague or generalized
  - Measurable: Goals must have measurable objectives
  - Attainable: Make sure that your goals are achievable and within your limit
  - Relevant: Will take you to the direction you want your life and career to go
  - Time Bound: You must know when you have the deadline and can celebrate success
3. Set Goals in Writing: Written commitment in presence of your close people (parents, close friends) will always push and remind you whenever you tend to deviate from your goal
4. Make an Action Plan: Do not focus only on the outcome, but make planning of all small steps that collectively take to the outcome. This is especially important if your goal is big and demanding, or long-term
5. Monitor Yourself: Compliance to the action plan should be monitored at least weekly (for one month goal) or monthly (for a yearly goal), depending upon your goal size.

## Remember,

“Success is not final; failure is not fatal: It is the courage to continue that counts.”

—*Winston S Churchill*

“There are two types of people who will tell you that you cannot make a difference in this world: those who are afraid to try and those who are afraid you will succeed.”

—*Ray Goforth*



Hospital Infection Control and Prevention (HICP) Unit, JIPMER, Puducherry, India



---

# Preface



**Apurba S Sastry**

It gives us immense pleasure to announce the release of *Essentials of Applied Microbiology for Nurses*. The excitement reaches its pinnacle as our sleepless nights of the last three months have come to an end.

The idea of scripting a Nursing book on Microbiology came to our mind as we received numerous requests from the Microbiology and Nursing faculties across the country to write a Microbiology book with a different approach exclusively catering to the nurses. The existing nursing books on this subject are discouraging with suboptimal matter and do not cover the infection control part, which is the most important area of Microbiology for Nurses.

Nurses are the pillar behind the success of any hospital. Their motherly care gives great relief to the patients. Proper training in Microbiology and infection control can produce competent nurses who will deliver better patient care.



**Sandhya Bhat**

- **Infection control activities:** The thorough knowledge of Nurses on various aspects of infection control such as contact precautions, e.g. hand hygiene with correct indications and steps, appropriate use of PPE is of immense help to prevent cross-transmission of infection in hospital.
- **Antimicrobial stewardship activities:** Nurses play a crucial role in several key activities of antimicrobial stewardship such as—(1) appropriate specimen collection by correct technique and at right time, (2) apposite administration of antimicrobials in the correct dose, frequency, etc.
- Comprehensive knowledge of **sterilization and disinfection** would help the Nurses to adhere to the disinfection policy and monitor environmental cleaning protocols in the healthcare facility.



**Infection Control Nurses** are the functional unit of the hospital infection control and prevention (HICP) unit and are pillars behind the implementation of infection control activities in healthcare facilities. Unfortunately, there is a paucity of infection control nurses in India. Therefore having in-depth knowledge of Microbiology and infection control can help nursing students in the future to pursue their careers as infection control nurses, which is a highly demanding and specialized area.

Keeping all the above-mentioned aspects in mind, we have drafted this textbook with a very unique approach to suit the need of nursing students of India—both in their examination and in clinical practice. The book has been thoroughly framed as per the revised Indian Nursing Council Curriculum for BSc Nursing 2021.

- Divided into two parts: Applied Microbiology and Infection Control Including Safety
- Applied Microbiology Part comprises of sections: General Microbiology, Immunology, Bacterial Infections, Viral Infections, Parasitic Infections, and Fungal Infections
- **Section 1:** *General Microbiology* section is meticulously structured with the inclusion of general bacteriology, general virology, general parasitology, and general mycology chapters. General bacteriology is reorganized into a single chapter with several sub-chapters
- **Section 2:** *Immunology* section covers topics such as immunity, components of the immune system, immune response, antigen, antibody and complement, antigen-antibody reaction, hypersensitivity reactions and immunoprophylaxis, and national immunization schedule
- **Section 3:** *Systematic Bacteriology* section covers topics such as gram-positive cocci (*Staphylococcus*, *Streptococcus*, *Pneumococcus*, *Enterococcus*), and gram-negative cocci infections (meningococcus and gonococcus), gram-positive bacilli infections (*Corynebacterium* and *Bacillus*), anaerobic infections, mycobacteria infections, gram-negative bacilli infections (Enterobacterales, *Vibrio*, non-fermenters, fastidious bacteria) and others
- **Section 4:** *Virology* section covers topics such as DNA viral infections like Herpes and others, and RNA viral infections such as Myxoviruses, rubella, coronaviruses, arboviruses, rabies, polio, HIV, hepatitis viruses, Ebola, viral gastroenteritis, oncogenic viruses, and others. COVID-19, the most catastrophic disease of today's date has been addressed as a completely new chapter covering in detail.
- **Section 5:** *Parasitology* section covers topics such as Amoebae, flagellates (*Giardia*, *Trichomonas*, *Leishmania*, and *Trypanosoma*), malaria parasite (*Plasmodium*), coccidian parasites infections, cestode, trematode and nematode (intestinal and tissue) infections
- **Section 6:** *Mycology* section covers topics such as superficial mycoses, subcutaneous mycoses, systemic (deep) mycoses, and opportunistic fungal infections
- **Section 7:** *Infection control* section comprises of topics such as healthcare-associated infections (HAI), standard precautions including hand hygiene and PPE, transmission-based precautions, major HAI types, HAI surveillance, and infection control committee, sterilization and disinfection (Including CSSD), biomedical waste management, needle stick injury, environmental surveillance, laundry management, immunization program for healthcare workers and antimicrobial stewardship
- **Section 8:** *Applied Microbiology* section comprises of topics on various infective syndromes such as bloodstream infection, meningitis, UTI, diarrhea, respiratory infection, and others.
- A separate chapter on *Specimen Collection* has been incorporated covering in-depth various aspects of appropriate specimen collection—correct technique, adequate volume, and at the correct time (before the start of antimicrobials),
- The chapter on Practical Microbiology has been incorporated covering the various practical aspects of Microbiology and Infection Control relevant to Nurses including several problem-solving exercises
- Patient Safety and Safety Protocol for Healthcare Personnel have been added as separate chapters, which is as per the new curriculum for BSc Nurses
- Most features of the author's popular MBBS book have been maintained in this book
  - More content, less pages—saves student's time
  - Concise, bulleted format, and to-the-point text—easy to read during the examination

- Simple and lucid language—makes the understanding easy
- Separate highlight boxes—for important topics and treatment boxes for quick review.

We hope that the nursing students will relish reading this book and find it useful. We also hope that we have made a good start in addressing the varied needs of nursing students and faculties teaching microbiology for nurses with a single comprehensive book. We will feel glad to receive your valuable feedback, which will enable us to improve further.

 <b>Apurba S Sastry</b> <apurbasastromicrobiology@gmail.com>	 <b>Sandhya Bhat</b> <sandhyabhatk@gmail.com>
---	--

---

# ACKNOWLEDGMENTS

The release of *Essentials of Applied Microbiology for Nurses* would not have been possible without our close association with many people. We take this opportunity to extend our sincere gratitude and appreciation to all those who made this book possible.

## **Hearty acknowledgments to our teachers, departmental staff, family members, and others, for their blessings and support.**

1. We are extremely thankful to Director, JIPMER, Puducherry, and Director-Principal, Pondicherry Institute of Medical Sciences (PIMS), Puducherry for giving permission to write this textbook.
2. We would like to sincerely thank **Dr Deepashree R**, Assistant Professor of Microbiology, JSS Medical College, Mysuru, Karnataka, for her input during the manuscript preparation.
3. We would like to sincerely thank **Dr Ketan Priyadarshi**, Senior Resident and Fellow in Hospital Infection Control, JIPMER for his inputs during the manuscript preparation.
4. **Faculty of Department of Microbiology, JIPMER** for their constant support, inputs and help during preparation—Dr Sujatha S (Professor), Dr Rakesh Singh (Professor and Head), Dr Jharna Mandal (Professor), Dr Rahul Dhodapkar (Professor), Dr Noyal M Joseph (Additional Professor), Dr Rakhi Biswas (Additional Professor), Dr Nonika Rajkumari (Additional Professor) and Dr Maanasa Bhaskar (Assistant Professor).
5. **Faculty of Department of Microbiology, PIMS** for their constant support, inputs, and help during preparation—Dr Shashikala, (Professor and Head), Dr Sheela Devi (Professor), Dr Johny Asir (Professor), Dr Vivian Joseph P (Professor), Dr Sujitha E (Associate Professor), Dr Arthi E (Associate Professor), Dr Patricia Anita (Associate Professor), Dr Meghna (Assistant Professor), Mrs Desdemona Rasitha (Tutor) and Mr Gnanavelu E (Tutor).
6. **Residents and postgraduates**, Department of Microbiology, JIPMER and Pondicherry Institute of Medical Sciences (PIMS), Puducherry.
7. **HICP, JIPMER**—infection control nurses and support office staff such as Ms Ilaveni, Ms Ramya, and Mr Venkat.
8. **Infection control nurses**, HICC, Pondicherry Institute of Medical Sciences, Puducherry.
9. **Microbiology faculty from various institutes**—for their inputs during manuscript preparation
  - **Dr Anand B Janagond**, Professor of Microbiology, S Nijalingappa Medical College, Bagalkot, Karnataka
  - **Dr Tessa Antony**, Faculty of Microbiology, Ramachandra Medical College, Chennai
  - **Dr Sribal Selvarajan**, Faculty of Microbiology, Ramachandra Medical College, Chennai
  - **Dr MJ Kumari**, Professor cum Principal (Ag.) and Vice Principal, College of Nursing, JIPMER, Puducherry
  - **Sr Dr Mony K**, Principal, College of Nursing, PIMS, Puducherry
  - **Mrs Jessica Shushma D'Souza and Dr Mridula M**, Faculty of Microbiology, Kasturba Medical College, Manipal, Karnataka.
10. **Special thanks to our teachers**—Dr Reba Kanungo (PIMS, retired), Dr SC Parija (JIPMER, retired), Dr BN Harish (JIPMER, retired), Dr ER Nagaraj (SSMC Tumkur, retired), Dr Sharadadevi Mannur (CDSIMER, Bengaluru) and Dr Renushree (SSMC, Tumkur).
11. **For providing photographs**—We are extremely thankful to all people/institutes/companies who have agreed to provide valuable photographs.

As you know, human errors are inevitable; and no book is immune to them. We would request all the readers to provide any errata found and also valuable inputs.

If any reader wishes to share feedback, suggestions, updates, and errata, please feel free to mail us at <apurbasastrymicrobiology@gmail.com>. As a token of gratitude, the reader will be acknowledged in the subsequent edition of the book.

### **Special Acknowledgments to My Publishers**

#### **Jaypee Brothers Medical Publishers (P) Ltd, New Delhi, India**

- Shri Jitendar P Vij (Group Chairman)
- Mr Ankit Vij (Managing Director)
- Mr MS Mani (Group President)
- Dr Madhu Choudhary (Director–Educational Publishing): She has been a great support throughout the manuscript preparation
- Ms Pooja Bhandari (Production Head)
- Ms Seema Dogra (Cover Visualizer)
- Dr Astha Sawhney (Assistant Manager): Extremely dynamic, have lot of patience and available 24×7 to address to our queries
- **The Development Team:** Mr Deepak Saxena (Typesetters), Mr Nitin Bhardwaj (Graphic Designer), Mr Binay Kumar (Proofreader). These guys are simply outstanding in their work. A special mention for Mr Deepak Saxena, we must say that he is the best operator of India in medical publishing. The way Nitin Bhardwaj does the designing of photographs is extraordinary. It is a treat for us to work with all of them. These guys are extremely workaholic and have a very good team spirit. We salute them, for their professionalism.
- **Marketing heads from various zones:** Mr Narendra Shekhawat (Vice President–Sales), Mr Venugopal V (South Head), Mr Rishi Sharma (North Region Head), CS Gawde (Western Head) and Sandip Gupta (Eastern Head).
- **Branch managers and Sales manager from various branches:** Bengaluru branch (Ravi Kumar, A Palani, E Venkatesh), Chennai branch (Maran A [Adoption Head for South], Dharani Kumar P, RK Dharani, Dharanidaran), Kochi branch (Sujeesh VS, Diffin Robin, Arun Kumar), Hyderabad branch (Parimal Guha Neogy, Marthanda Sarma, Rajesh Malothu, Hamza Ali), Mumbai branch (Sameer S Mulla), Nagpur branch (Rajesh Shrivastava), Ahmedabad branch (Ms Priyanka Kansara, Dinesh Waghade), Delhi branch (Sujatha Puri), Kolkata branch (Sanjoy Chakraborty).

Lastly, we would like to keep in record that without the support of our son, parents (of both Dr Sandhya and Dr Apurba) and other family members, it would have been impossible to continue the spirit on, during the journey of the current edition. A special mention to our son (Master Adarsh), who really helped us being very much cooperative. In fact, he was encouraging us to work for the book. We deeply apologize to you as well as our parents (Mr Anooj Sastry and Ms Tarini Purohit), as we could not give enough time and care during the manuscript preparation.

**Apurba S Sastry**

**Sandhya Bhat**

---

# INC SYLLABUS

## APPLIED MICROBIOLOGY AND HOSPITAL INFECTION CONTROL INCLUDING SAFETY

**Placement:** III SEMESTER

**Theory:** 2 Credits (40 hours)

**Practical:** 1 Credit (40 hours) (Lab/Experiential Learning – L/E)

### SECTION A: APPLIED MICROBIOLOGY

**Theory:** 20 hours

**Practical:** 20 hours (Lab/Experiential Learning – L/E)

**Description:** 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.

**Competencies:** On completion of the course, the students will be able to:

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.
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.
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.

### COURSE OUTLINE

**T – Theory, L/E – Lab/Experiential Learning**

<i>Unit</i>	<i>Time (Hrs)</i>		<i>Learning Outcomes</i>	<i>Content</i>	<i>Teaching/ Learning Activities</i>	<i>Assessment Methods</i>
	<i>T</i>	<i>P</i>				
I	3		Explain concepts and principles of microbiology and its importance in nursing	<b>Introduction:</b> <ul style="list-style-type: none"><li>• Importance and relevance to nursing</li><li>• Historical perspective</li><li>• Concepts and terminology</li></ul>	<ul style="list-style-type: none"><li>• Lecture cum Discussion</li></ul>	<ul style="list-style-type: none"><li>• Short answer</li><li>• Objective type</li></ul>

INC SYLLABUS

<i>Unit</i>	<i>Time (Hrs)</i>		<i>Learning Outcomes</i>	<i>Content</i>	<i>Teaching/ Learning Activities</i>	<i>Assessment Methods</i>
	<i>T</i>	<i>P</i>				
				<ul style="list-style-type: none"> <li>Principles of microbiology</li> </ul>		
II	10	10 (L/E)	Describe structure, classification morphology and growth of bacteria	<p><b>General characteristics of Microbes:</b></p> <ul style="list-style-type: none"> <li>Structure and classification of Microbes</li> <li>Morphological types</li> <li>Size and form of bacteria</li> </ul>	<ul style="list-style-type: none"> <li>Lecture cum Discussion</li> <li>Demonstration</li> <li>Experiential Learning through visual</li> </ul>	<ul style="list-style-type: none"> <li>Short answer</li> <li>Objective type</li> </ul>
			Identify Microorganisms	<ul style="list-style-type: none"> <li>Motility</li> <li>Colonization</li> <li>Growth and nutrition of microbes</li> <li>Temperature</li> <li>Moisture</li> <li>Blood and body fluids</li> <li>Laboratory methods for identification of microorganisms</li> <li>Types of staining—simple, differential (Gram's, AFB), special—capsular staining (negative), spore, LPCB, KOH mount</li> </ul>		

INC SYLLABUS

<i>Unit</i>	<i>Time (Hrs)</i>		<i>Learning Outcomes</i>	<i>Content</i>	<i>Teaching/ Learning Activities</i>	<i>Assessment Methods</i>
	<i>T</i>	<i>P</i>				
				<ul style="list-style-type: none"> <li>• 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</li> </ul>		
III	4	6 (L/E)	Describe the different disease producing organisms	<p><b>Pathogenic organisms</b></p> <ul style="list-style-type: none"> <li>• Micro-organisms: Cocci—gram-positive and gram-negative; Bacilli —gram-positive and gram-negative</li> <li>• Viruses</li> <li>• Fungi: Superficial and deep mycoses</li> <li>• Parasites</li> </ul>	<ul style="list-style-type: none"> <li>• Lecture cum Discussion</li> <li>• Demonstration</li> <li>• Experiential learning through visual</li> </ul>	<ul style="list-style-type: none"> <li>• Short answer</li> <li>• Objective type</li> </ul>



INC SYLLABUS

<i>Unit</i>	<i>Time (Hrs)</i>		<i>Learning Outcomes</i>	<i>Content</i>	<i>Teaching/ Learning Activities</i>	<i>Assessment Methods</i>
	<i>T</i>	<i>P</i>				
				<ul style="list-style-type: none"> <li>• Rodents and Vectors</li> <li>• Characteristics, source, portal of entry, transmission of infection, identification of disease producing micro-organisms</li> </ul>		
IV	3	4 (L/E)	Explain the concepts of immunity, hyper sensitivity and immunization	<p><b>Immunity</b></p> <ul style="list-style-type: none"> <li>• Immunity: Types, classification</li> <li>• Antigen and antibody reaction</li> <li>• Hypersensitivity reactions</li> <li>• Serological tests</li> <li>• Immunoglobulins: Structure, types and properties</li> <li>• Vaccines: Types and classification, storage and handling, cold chain, immunization for various diseases</li> <li>• Immunization schedule</li> </ul>	<ul style="list-style-type: none"> <li>• Lecture</li> <li>• Discussion</li> <li>• Demonstration</li> <li>• Visit to observe vaccine storage</li> <li>• Clinical practice</li> </ul>	<ul style="list-style-type: none"> <li>• Short answer</li> <li>• Objective type</li> <li>• Visit report</li> </ul>

# SECTION B: INFECTION CONTROL and SAFETY

**Theory:** 20 hours

**Practical/Lab:** 20 hours (Lab/Experiential Learning – L/E)

**Description:** This course is designed to help students to acquire knowledge and develop competencies required for fundamental patient safety and infection control in delivering patient care. It also focuses on identifying patient safety indicators, preventing and managing hospital acquired infections, and in following universal precautions.

**Competencies:** The students will be able to:

1. Develop knowledge and understanding of Hospital Acquired Infections (HAIs) 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 Handwashing and appropriate use of different types of PPE.
4. Illustrate various disinfection and sterilization methods and techniques.
5. Demonstrate knowledge and skill in specimen collection, handling and transport to optimize the diagnosis for treatment.
6. Incorporate the principles and guidelines of Biomedical 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.
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 OUTLINE

**T – Theory, L/E – Lab/Experiential Learning**

<i>Unit</i>	<i>Time (Hrs)</i>		<i>Learning Outcomes</i>	<i>Content</i>	<i>Teaching/ Learning Activities</i>	<i>Assessment Methods</i>
	<i>T</i>	<i>P</i>				
I	2	2 (E)	Summarize the evidence based and effective patient care practices for the prevention of common healthcare associated infections in the healthcare setting	<b>HAI (Hospital Acquired Infection)</b> <ul style="list-style-type: none"> <li>• Hospital acquired infection</li> <li>• Bundle approach</li> <li>• Prevention of Urinary</li> </ul>	<ul style="list-style-type: none"> <li>• Lecture and Discussion</li> <li>• Experiential Learning</li> </ul>	<ul style="list-style-type: none"> <li>• Knowledge assessment</li> <li>• MCQ</li> <li>• Short answer</li> </ul>

SECTION B: INFECTION  
CONTROL and SAFETY

<i>Unit</i>	<i>Time (Hrs)</i>		<i>Learning Outcomes</i>	<i>Content</i>	<i>Teaching/ Learning Activities</i>	<i>Assessment Methods</i>
	<i>T</i>	<i>P</i>				
				Tract Infection (UTI) <ul style="list-style-type: none"> <li>• Prevention of Surgical Site Infection (SSI)</li> <li>• Prevention of Ventilator Associated Events (VAE)</li> <li>• Prevention of Central Line Associated Blood Stream Infection (CLABSI)</li> <li>• Surveillance of HAI— Infection control team and Infection control committee</li> </ul>		
II	3	4 (L)	Demonstrate appropriate use of different types of PPEs and the critical use of risk assessment	<b>Isolation Precautions and use of Personal Protective Equipment (PPE)</b> <ul style="list-style-type: none"> <li>• Types of isolation system, standard precaution and transmission-based</li> </ul>	<ul style="list-style-type: none"> <li>• Lecture</li> <li>• Demonstration and Re-demonstration</li> </ul>	<ul style="list-style-type: none"> <li>• Performance assessment</li> <li>• OSCE</li> </ul>

SECTION B: INFECTION  
CONTROL and SAFETY

<i>Unit</i>	<i>Time (Hrs)</i>		<i>Learning Outcomes</i>	<i>Content</i>	<i>Teaching/ Learning Activities</i>	<i>Assessment Methods</i>
	<i>T</i>	<i>P</i>				
				precautions (direct contact, droplet, indirect) <ul style="list-style-type: none"> <li>• Epidemiology and infection prevention —CDC guidelines</li> <li>• Effective use of PPE</li> </ul>		
III	1	2 (L)	Demonstrate the hand hygiene practice and its effectiveness on infection control	<b>Hand Hygiene</b> <ul style="list-style-type: none"> <li>• Types of hand hygiene</li> <li>• Hand washing and use of alcohol hand rub</li> <li>• Moments of hand hygiene</li> <li>• WHO hand hygiene promotion</li> </ul>	<ul style="list-style-type: none"> <li>• Lecture</li> <li>• Demonstration and Re-demonstration</li> </ul>	<ul style="list-style-type: none"> <li>• Performance assessment</li> </ul>
IV	1	2 (E)	Illustrates disinfection and sterilization in the healthcare setting	<b>Disinfection and sterilization</b> <ul style="list-style-type: none"> <li>• Definitions</li> <li>• Types of disinfection and sterilization</li> <li>• Environment cleaning</li> <li>• Equipment cleaning</li> </ul>	<ul style="list-style-type: none"> <li>• Lecture</li> <li>• Discussion</li> <li>• Experiential learning through visit</li> </ul>	<ul style="list-style-type: none"> <li>• Short answer</li> <li>• Objective type</li> </ul>

SECTION B: INFECTION  
CONTROL and SAFETY

Unit	Time (Hrs)		Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
	T	P				
				<ul style="list-style-type: none"> <li>Guides on use of disinfectants</li> <li>Spaulding's principle</li> </ul>		
V	1		Illustrate on what, when, how, why specimens are collected to optimize the diagnosis for treatment and management	<p><b>Specimen Collection (Review)</b></p> <ul style="list-style-type: none"> <li>Principle of specimen collection</li> <li>Types of specimens</li> <li>Collection techniques and special considerations</li> <li>Appropriate containers</li> <li>Transportation of the sample</li> <li>Staff precautions in handling specimens</li> </ul>	<ul style="list-style-type: none"> <li>Discussion</li> </ul>	<ul style="list-style-type: none"> <li>Knowledge evaluation</li> <li>Quiz</li> <li>Performance assessment</li> <li>Checklist</li> </ul>
VI	2	2 (E)	Explain on Biomedical waste management and laundry management	<p><b>BMW (Biomedical Waste Management)</b></p> <p><i>Laundry management process and infection control and prevention</i></p> <ul style="list-style-type: none"> <li>Waste management process and infection prevention</li> </ul>	<ul style="list-style-type: none"> <li>Discussion</li> <li>Demonstration</li> <li>Experiential learning through visit</li> </ul>	<ul style="list-style-type: none"> <li>Knowledge assessment by short answers, objective type</li> <li>Performance assessment</li> </ul>

SECTION B: INFECTION  
CONTROL and SAFETY

<i>Unit</i>	<i>Time (Hrs)</i>		<i>Learning Outcomes</i>	<i>Content</i>	<i>Teaching/ Learning Activities</i>	<i>Assessment Methods</i>
	<i>T</i>	<i>P</i>				
				<ul style="list-style-type: none"> <li>• Staff precautions</li> <li>• Laundry management</li> <li>• Country ordinance and BMW National Guidelines 2017: Segregation of wastes, color coded waste containers, waste collection and storage, packaging and labeling, transportation</li> </ul>		
VII	2		<p>Explain in detail about antibiotic stewardship, AMR</p> <p>Describe MRSA/ MDRO and its prevention</p>	<p><b>Antibiotic stewardship</b></p> <ul style="list-style-type: none"> <li>• Importance of antibiotic stewardship</li> <li>• Anti-microbial resistance</li> <li>• Prevention of MRSA, MDRO in healthcare setting</li> </ul>	<ul style="list-style-type: none"> <li>• Lecture</li> <li>• Discussion</li> <li>• Written assignment– Recent AMR (Antimicrobial resistance) guidelines</li> </ul>	<ul style="list-style-type: none"> <li>• Short answer</li> <li>• Objective type</li> <li>• Assessment of assignment</li> </ul>
VIII	3	5 (L/E)	<p>Enlist the patient safety indicators followed in a health care organization and the role of nurse in the patient safety audit process</p>	<p><b>Patient Safety Indicators</b></p> <ul style="list-style-type: none"> <li>• Care of vulnerable patients</li> <li>• Prevention of Iatrogenic injury</li> </ul>	<ul style="list-style-type: none"> <li>• Lecture</li> <li>• Demonstration</li> <li>• Experiential learning</li> <li>• Lecture</li> <li>• Role play</li> </ul>	<ul style="list-style-type: none"> <li>• Knowledge assessment</li> <li>• Performance assessment</li> <li>• Checklist/ OSCE</li> <li>• Knowledge assessment</li> </ul>

SECTION B: INFECTION  
CONTROL and SAFETY

<i>Unit</i>	<i>Time (Hrs)</i>		<i>Learning Outcomes</i>	<i>Content</i>	<i>Teaching/ Learning Activities</i>	<i>Assessment Methods</i>
	<i>T</i>	<i>P</i>				
			<p>Captures and analyzes incidents and events for quality improvement</p>	<ul style="list-style-type: none"> <li>• Care of lines, drains and tubing's</li> <li>• Restrain policy and care – Physical and chemical</li> <li>• Blood and blood transfusion policy</li> <li>• Prevention of IV complication</li> <li>• Prevention of fall</li> <li>• Prevention of DVT</li> <li>• Shifting and transporting of patients</li> <li>• Surgical safety</li> <li>• Care coordination event related to medication reconciliation and administration</li> <li>• Prevention of communication errors</li> <li>• Prevention of HAI</li> <li>• Documentation</li> </ul>	<ul style="list-style-type: none"> <li>• Inquiry based learning</li> </ul>	<ul style="list-style-type: none"> <li>• Short answer</li> <li>• Objective type</li> </ul>

SECTION B: INFECTION  
CONTROL and SAFETY

<i>Unit</i>	<i>Time (Hrs)</i>		<i>Learning Outcomes</i>	<i>Content</i>	<i>Teaching/ Learning Activities</i>	<i>Assessment Methods</i>
	<i>T</i>	<i>P</i>				
				<b>Incidents and Adverse Events</b> <ul style="list-style-type: none"> <li>• Capturing of incidents</li> <li>• RCA (Root cause analysis)</li> <li>• CAPA (Corrective and preventive action)</li> <li>• Report writing</li> </ul>		
IX	1		Enumerate IPSG and application of the goals in the patient care settings	<b>IPSG (International Patient Safety Goals)</b> <ul style="list-style-type: none"> <li>• Identify patient correctly</li> <li>• Improve effective communication</li> <li>• Improve safety of high alert medication</li> <li>• Ensure safe surgery</li> <li>• Reduce the risk of health care associated infection</li> <li>• Reduce the risk of patient harm resulting from falls</li> </ul>	<ul style="list-style-type: none"> <li>• Lecture</li> <li>• Role play</li> </ul>	<ul style="list-style-type: none"> <li>• Objective type</li> </ul>



SECTION B: INFECTION  
CONTROL and SAFETY

<i>Unit</i>	<i>Time (Hrs)</i>		<i>Learning Outcomes</i>	<i>Content</i>	<i>Teaching/ Learning Activities</i>	<i>Assessment Methods</i>
	<i>T</i>	<i>P</i>				
				<ul style="list-style-type: none"> <li>• Reduce the harm associated with clinical alarm system</li> </ul>		
X	2	3 (L/E)	Enumerate the various safety protocols and its applications	<p><b>Safety protocol</b></p> <ul style="list-style-type: none"> <li>• 5S (Sort, Set in order, Shine, Standardize, Sustain)</li> <li>• Radiation safety</li> <li>• Laser safety</li> <li>• Fire safety               <ul style="list-style-type: none"> <li>• Types and classification of fire</li> <li>• Fire alarms</li> <li>• Firefighting equipment</li> </ul> </li> <li>• HAZMAT (Hazardous Materials) safety               <ul style="list-style-type: none"> <li>• Types of spill</li> <li>• Spillage management</li> <li>• MSDS (Material Safety Data Sheets)</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Lecture</li> <li>• Demonstration/ Experiential learning</li> </ul>	<ul style="list-style-type: none"> <li>• Mock drills</li> <li>• Post tests</li> <li>• Checklist</li> </ul>

SECTION B: INFECTION  
CONTROL and SAFETY

<i>Unit</i>	<i>Time (Hrs)</i>		<i>Learning Outcomes</i>	<i>Content</i>	<i>Teaching/ Learning Activities</i>	<i>Assessment Methods</i>
	<i>T</i>	<i>P</i>				
				<ul style="list-style-type: none"> <li>• Environmental safety</li> <li>• Risk assessment</li> <li>• Aspect impact analysis</li> <li>• Maintenance of temp and humidity (Department wise)</li> <li>• Audits</li> <li>• Emergency codes</li> <li>• Role of nurse in times of disaster</li> </ul>		
XI	2		<p>Explain importance of employee safety indicators</p> <p>Identify risk of occupational hazards, prevention and post exposure prophylaxis.</p>	<p><b>Employee Safety Indicators</b></p> <ul style="list-style-type: none"> <li>• Vaccination</li> <li>• Needle stick injuries (NSI) prevention</li> <li>• Fall prevention</li> <li>• Radiation safety</li> <li>• Annual health check</li> </ul> <p><b>Healthcare Worker Immunization Program and management of</b></p>	<ul style="list-style-type: none"> <li>• Lecture</li> <li>• Discussion</li> <li>• Lecture method</li> <li>• Journal review</li> </ul>	<ul style="list-style-type: none"> <li>• Knowledge assessment by short answers, objective type</li> <li>• Short answer</li> </ul>

SECTION B: INFECTION  
CONTROL and SAFETY

<i>Unit</i>	<i>Time (Hrs)</i>		<i>Learning Outcomes</i>	<i>Content</i>	<i>Teaching/ Learning Activities</i>	<i>Assessment Methods</i>
	<i>T</i>	<i>P</i>				
				<b>occupational exposure</b> <ul style="list-style-type: none"> <li>• Occupational health ordinance</li> <li>• Vaccination program for healthcare staff</li> <li>• Needle stick injuries and prevention and post exposure prophylaxis</li> </ul>		

**\*Experiential Learning:**

Experiential learning is the process by which knowledge is created through the process of experience in the clinical field.