

# MICROBIOLOGY/INFECTIOUS DISEASE

## A. GOALS AND OBJECTIVES:

1. To promote the learning of microbiology related to infectious diseases in a clinical context.
2. To support student
3. learning towards developing an approach to investigation, diagnosis and treatment for common and important infectious diseases.

## B. CURRICULUM PLAN SUMMARY:

Micro/ID objectives in Years 1 to 4 as outlined in the tables below are spiraled to add complexity as students transition from pre- clinical to clerkship years, with the goal of achieving exit competencies, primarily from the Expert domain, but others as well. These exit competencies are achieved by setting milestones for segments of the curriculum. The course and session-level objectives are associated with these milestones. With the exception of the Microbiology section in the Introductory module of Foundations I, micro/ID related session objectives in Years 1 and 2 will typically focus on students' ability to recognize clinical presentations of urgent and common infectious diseases, describe most likely pathogen(s) for the presentation, the investigations required and treatment.

To support student learning, lists of essential 'need to know' pathogens are provided at the end of this roadmap, along with supplemental listings for further advancement of learning.

**C. OBJECTIVES**

<b>Years One and Two</b>	<b>Milestone Goals</b>
Microbiology section of Introductory Module in Foundations I	1. Recognize local and systemic clinical features of infection in general
	2. Recognize variation in micro-organisms in general terms, including differences between normal flora ecosystems, propensity to cause human disease and factors influencing virulence. - Classify bacteria according to Gram stain reaction and morphology
	3. Describe common and clinically important bacterial, viral, fungal and parasitic agents implicated in common infectious diseases.
	4. Describe methods of transmission of infectious diseases being able to give common examples for each
	5. Describe methods of infection control including personal protection strategies and aseptic technique.
	6. Describe the different classes and the spectrum of activity of commonly used antibiotics. - name commonly used antibiotics - describe which organisms/type of infection they are commonly used for
	7. Begin to recognize the role/value of antibiotic stewardship in minimizing development of antibiotic resistant organisms.
Respiratory	1. Tuberculosis disease and TB infection (latent TB)
	2. Lower respiratory tract infections including influenza and covid-19
	3. Pediatric upper respiratory tract infections including Croup, Tracheitis, Epiglottitis, Retropharyngeal abscess/Tonsillar abscess, otitis media, otitis externa, sinusitis, pharyngitis
	4. Respiratory tract infections in special populations- COPD and Cystic Fibrosis
Neurosciences	1. Acute and chronic meningitis
	2. Encephalitis
	3. Cerebral abscess
	4. Viral infections
	5. Neurocysticercosis
	6. Ocular infections- Conjunctivitis, keratitis
Kidney and Urinary Tract	1. Pediatric UTI
	2. Cystitis
	3. Pyelonephritis
	4. Renal abscess
	5. Epididymitis and orchitis
	6. Fournier's gangrene

	7. Asymptomatic bacteruria
MSK	1. Osteomyelitis
	2. Septic arthritis
	3. Septic bursitis/tendonitis
Gastrointestinal	1. Peritonitis
	3. Liver abscess
	4. HIV
	5. Peptic ulcer disease
	6. Infectious causes of diarrhea
	7. Acute hepatitis
Cardiovascular	1. Valvular disease and endocarditis
	2. Diabetic foot management
	3. Shock and Sepsis
Dermatology	1. Folliculitis
	2. Furuncles and Carbuncles
	3. Glandular infections including hordeolum and chalazion
	4. Cellulitis, erysipelas, impetigo,
	5. Fungal skin infections
	6. Infestations- scabies, lice and bed bugs
	7. Warts, growths, blisters/bullae and ulcers
	8. Toxin related infections
	9. Deep tissue infections including necrotizing fasciitis
	10. Lymphocutaneous infections
	11. ulceroglandular infections including agents of bioterrorism
Reproductive system	1. Cervical dysplasia and HPV
	2. Viral and Bacterial Perinatal infections
	3. PID and tubo-ovarian abscess
	4. Urethritis
	5. Cervicitis
	6. Balanitis
	7. Vaginitis
	8. Valvular disease including warts and ulcers
	9. Puerperal sepsis- endometritis
	2. Mastitis/abscess
Hematology	1. Febrile neutropenia
Year 3 and 4	
	1. Shock/Sepsis -know the definition and clinical presentation of shock/sepsis
	2. Line/catheter infections -know the importance of aseptic technique in infection prevention
	3. Fever in the returning traveler (including tropical infections such as malaria and typhoid)

	-know the importance of a detailed travel history and the relevant risk factors in establishing the diagnosis
	4. Infections in immunocompromised hosts - splenectomy - recognize the importance of the innate immune system
	5. vaccination recommendations in different populations - infancy and childhood - elderly - splenectomy -recognize the importance of vaccination in infection prevention and control on a personal as well as a population level
	6. Bites – human and animal
	7. Blood and body fluid exposures

**Pathogen List:**

Pathogens listed in the **Essential Tables** are an inventory of infectious agents for which graduating medical students should be able to recognize clinical presentations, understand diagnostic tests, and provide management plans (including an appropriate antimicrobial agent..

Pathogens listed in the **Supplementary Tables** are infectious agents for which graduating medical students should be able to recognize clinical presentations. Additional information with respect to investigation and management is not necessary at the level of the undergraduate student.

Essential to know Gram positive cocci	
<i>Genus</i>	<i>Species</i>
Staphylococcus	aureus, Coagulase Negative Staphylococci
Streptococcus	viridans group, pneumoniae, Beta-hemolytic streptococci,
Enterococcus	faecium, faecalis

Essential to know Gram positive bacilli	
<i>Genus</i>	<i>Species</i>
Clostridium	difficile, tetani
Listeria	monocytogenes

<b>Essential to know Gram negative bacilli</b>	
<i>Genus</i>	<i>Species</i>
Escherichia	coli
Pasteurella	multocida
Helicobacter	pylori
Klebsiella	pneumoniae
Pseudomonas	aeruginosa
Salmonella	typhi
Shigella	dysenteriae

<b>Essential to know Gram negative coccobacilli</b>	
<i>Genus</i>	<i>Species</i>
Bordetella	pertussis
Haemophilus	influenzae type B, influenzae non-typable

<b>Essential to know Gram negative cocci</b>	
<i>Genus</i>	<i>Species</i>
Neisseria	meningitidis, gonorrhoea
Moraxella	catarrhalis

<b>Essential to know – Other bacteria</b>	
<i>Genus</i>	<i>Species</i>
Chlamydia	trachomatis,
Respiratory Atypical Infections (Chlamydia pneumoniae, Mycoplasma pneumoniae)	
Mycobacterium	tuberculosis, avium complex
Treponema	pallidum
Anaerobic bacteria (general)	

<b>Essential to know – yeasts/molds</b>	
<i>Genus</i>	<i>Species</i>
Candida	Albicans, glabrata
Dermatophytes (Trichosporon, Microsporum, Epidermophyton)	
Aspergillus	fumigatus
Cryptococcus	Neoformans, gatii

<b>Essential to know – parasites/worms</b>	
<i>Genus</i>	<i>Species</i>
Cryptosporidium	
Enterobius	vermicularis
Plasmodium	falciparum
Giardia	lamblia

<b>Essential to know - viruses</b>	
Human immunodeficiency virus	
Epstein-Barr virus	
Herpes simplex virus	
Varicella zoster virus	
Influenza	
Parainfluenza	
Respiratory syncytial virus	
Norovirus	
Rotavirus	
Hepatitis A virus	
Hepatitis B virus	
Hepatitis C virus	
Enterovirus	
West Nile virus	
Human papilloma virus	
Measles	
Covid-19 and Monkeypox as new pathogens	

<b>Supplementary - bacteria</b>	
<i>Genus</i>	<i>Species</i>
Aeromonas	hydrophila
Bacillus	Anthraxis, cereus
Bartonella	henselae
Borrelia	burgdorferi
Campylobacter	jejuni
Clostridium	perfringens, botulinum
Corynebacterium	diphtheriae
Coxiella	burnetii
Enterobacter	
HACEK – Haemophilus aphrophilus, Actinobacillus, Cardiobacterium, Eikenella corrodens, Kingella	
Legionella	pneumophila

Lymphogranuloma	venereum
Proteus	mirabilis
Rickettsiae	
Serratia	
Vibrio	cholera

<b>Supplementary - yeasts / molds</b>
Dimorphics – Blastomyces, Histoplasma, Coccidioides Pneumocystis jirovecii

<b>Supplementary – parasites / worms</b>	
<i>Genus</i>	<i>Species</i>
Taenia	Saginata, solium
Toxoplasma	gondii
Ascaris	lumbricoides
Strongyloides	stercoralis

<b>Supplementary – viruses</b>
Adenovirus
Cytomegalovirus
Dengue
Hepatitis D virus
Hepatitis E virus
Mumps
Poliovirus
Rubella
Smallpox
Ebola