

**Lecture Title:**  
**INTRODUCTION TO MEDICAL MICROBIOLOGY ( 1 HOUR)**

**Learning Outcomes:**

**(A) Knowledge**

At the end of the course, the students should be able to:

1. State the normal flora and infective microorganisms of the human body and describe the host-parasite relationship
2. List the pathogenic microorganisms, their general characteristics, classifications, nomenclature and methods of identification of bacteria
3. State the sources, modes of transmission and describe the pathogenesis of the diseases produced by the microorganisms.
4. Describe the mechanisms of immunity of infection
5. Apply the methods of sterilization and disinfection to prevent and control infections
6. State the suitable antimicrobial agents for treatment and vaccines available for prevention of communicable diseases
7. Recommend the laboratory investigations for making a microbiological diagnosis.

**(B) Skills**

At the end of the course, the students should be able to:

1. Use the correct method of collection, storage and transport of clinical specimens for microbiological investigations
2. Plan and interpret laboratory investigations for the diagnosis of infectious diseases and to correlate the clinical manifestations with the aetiologic agents.
3. Identify the common infectious agents with the use of basic laboratory procedures and the use of sensitivity tests to select suitable antimicrobial agents.

**Lecture Outline:**

1. Objectives of the course
2. Scope of Medical Microbiology: Bacteriology, Virology, Mycology and Immunology
3. Historical Foundation
4. Koch's Postulate
5. General characteristics of microorganisms: Prokaryotic / Eukaryotic, Virus, Bacteria, Fungus
6. Bacteria: description, nomenclature, commensal / pathogen, classification, Gram stain
7. Terminology: Definition of normal flora, carriage, aetiology, pathogenesis, virulence, epidemiology, laboratory diagnosis, prevention and control.

**Main References:**

Recommended textbook  
Reference book

**Lecture Title:****BACTERIAL STRUCTURE, GROWTH, GENETICS AND CULTIVATION ( 1 HOUR)****Learning Outcomes:**

At the end of the course the students should be able to:

1. Describe the bacterial structure and composition in comparison with eukaryotic cells.
2. Discuss the phases and factors influencing bacterial growth, the structure and functioning of bacterial DNA and RNA, and cultivation of bacteria.

**Lecture Outline:**

1. Prokaryotic and eukaryotic cells – examples and differences
2. Structure and function of the prokaryotic cell
3. Gram stain – differences in Gram- positive and Gram- negative cell walls
4. Composition of bacterial cell
5. Factors influencing bacterial growth
  - nutrition
  - minerals
  - physical environmental-temperature, oxygen, CO<sub>2</sub>, pH, osmotic pressure
  - growth factors
6. Phases of bacterial growth
  - growth cycle
  - determination of bacterial growth
7. Bacterial genetics: Structure and functions of DNA and RNA
8. Transfer of genetic material:
  - Transduction
  - Transformation
  - Conjugation and recombination
9. Plasmids
10. Cultivation of bacteria in the laboratory using various media

**Main References:**

Color Atlas and Textbook of Diagnostic Microbiology. Edited by Koneman EW, Allen SD, *WM et al.* Fifth Edition. 1997. Published by Lippincott, New York.

Principles of Microbiology. Ronald M Atlas. Second Edition. 1997. Published by Wm, C.13 London

**Lecture Title:**  
**STAPHYLOCOCCUS AND STREPTOCOCCUS ( 1 HOUR )**

**Learning Outcomes:**

At the end of the course, the students should be able to:

1. List and classify the various medically important staphylococci, streptococci and enterococci (previously in the genus streptococcus) and state their importance in medicine
2. Describe the basic important features of these organisms and important biochemical tests in their identification
3. Discuss the virulence factors and the infections caused
4. Describe laboratory diagnosis of these organisms
5. List the antimicrobial drug treatment of choice and preventive methods where appropriate

**Lecture Outline:**

A. Staphylococci:

1. Introduction and classification
  - 1.1 General features of Staphylococci
  - 1.2 Differentiating Staphylococcus and Streptococcus
2. Important Group members
  - 2.1 Coagulase-positive and coagulase- negative Staphylococcus
  - 2.2 Methicillin-resistant *Staphylococcus aureus* (MRSA)
3. Gram stain morphology
4. Cultural characteristics
5. Virulence factors
6. Infections caused
7. Laboratory diagnosis
8. Antibiotic susceptibility
9. MRSA (methicillin- resistant S.aureus), VISA, VRSA

B. Streptococci

1. Introduction and classification of Streptococci, Enterococci
  - 1.1 Morphology, growth and cultural characteristics
  - 1.2 Hemolytic patterns and examples of alpha, beta and gamma-hemolytic streptococci
2. *Streptococcus pyogenes* (Group A beta hemolytic)
  - 2.1 Typing, antigenic determination and virulence factors
  - 2.2 Disease and complications
  - 2.3 Laboratory investigations
  - 2.4 Treatment and Prevention

3. *Streptococcus agalactiae* (Group B streptococcus)
  - 3.1 Virulence factors, diseases and laboratory investigations and identification.
  - 3.2 Treatment and Prevention
4. Enterococci and Viridans Streptococci
  - 4.1 Diseases and laboratory identification.
5. *Streptococcus pneumoniae*
  - 5.1 General characteristics, identification and typing
  - 5.2 Virulence factors
  - 5.3 Diseases
  - 5.4 Laboratory investigations
  - 5.5 Treatment and Prevention
6. Anaerobic streptococci
7. Nutritionally- variant Streptococci

**Main References:**

Notes on Medical Microbiology (J.Douglas Sleight and Morag Timbury)  
Medical Microbiology and Immunology Examination and Board Review – Warren Levinson and Ernest Jawetz (latest edition)  
Jawetz, Melnick and Adelberg's Medical Microbiology (Brooks, Butel, Morse).

**Lecture Title:**  
**NEISSERIA AND PARVOBACTERIA (1 HOUR)**

**Learning Outcomes:**

At the end of the session, students should be able to:

1. Describe important members of the family Parvobacteriaceae and of important Neisseria species (*Neisseria gonorrhoeae* and *Neisseria meningitidis*).
2. Discuss their microbiological characteristics, laboratory diagnosis and clinical significance.

**Lecture Outline**

**1. Parvobacteria**

Habitat, morphology, cultural characteristics, virulence factors, infections associated, antibiotic susceptibility of:

- 1.1 Haemophilus
- 1.2 Bordetella
- 1.3 Brucella
- 1.4 Pasteurella
- 1.5 Francisella
- 1.6 Actinobacillus

**2. Neisseria**

2.1 Classification

2.2 Discuss the disease gonorrhoea:

- pathogenicity (aetiological agent, predilection for columnar epithelium)
- clinical presentation
- laboratory diagnosis
- treatment and prevention

2.3 Meningococcus

- Infection caused by organisms
- Laboratory diagnosis and treatment, prevention

**Main References:**

Notes on Medical Medical Microbiology (Douglas Sleight and Morag Timbury)  
Jawetz, Melnick and Adelberg's ,Medical Microbiology (Brooks, Butel, Morse).

**Lecture Title:**

**ENTEROBACTERIACEAE AND OXIDASE-POSITIVE GRAM-NEGATIVE BACILLUS ( 1 HOUR)**

**Learning Outcomes:**

At the end of the course, the students should be able:

1. To recognize the important bacterial species
2. To define the general characteristics of these organisms
3. To define the diseases caused by these organisms
4. To define virulence factors of the organisms

**Lecture Outline:**

**(A) ENTEROBACTERIACEAE**

1. Genus:
  - Escherichia
  - Salmonella
  - Shigella
  - Klebsiella
  - Proteus
  - Enterobacter
  - Citrobacter
  - Yersinia
2. Important species in each genus
3. General characteristics
  - Morphology
  - Habitat
  - Growth requirements
  - Selective media for culture
  - Lactose positive and negative organisms
  - Antigenic structure
  - Serology
4. Pathogenicity and disease
  - Endotoxins
  - Exotoxins
  - Enterotoxins
  - Special virulence traits

## **(B) OXIDASE – POSITIVE GRAM-NEGATIVE BACILLUS**

### **Lecture Outline:**

Genus:

- Vibrio
- Pseudomonas
- Campylobacter
- Acinetobacter
- Helicobacter
- Flavobacterium
- Plesiomonas
- Burkholderia

For each GENUS, outline the:

- important species and biotypes
- general characteristics
- natural habitat
- growth requirements and culture
- virulence and pathogenicity
- isolation and identification
- antimicrobial sensitivity

### **Main References:**

Refer to recommended textbooks

**Lecture Title:**  
**MYCOBACTERIA ( 1 HOUR )**

**Learning Outcomes:**

At the end of the session, the learners should be able to:

1. Describe the general characteristics of mycobacteria
2. Describe the laboratory tests for identification of *M.tuberculosis*, *M.leprae* and atypical Mycobacteria
3. Discuss spectrum of infections caused by mycobacteria
4. Describe diagnosis of pulmonary tuberculosis
5. List the antimicrobial treatment and prevention methods

**Lecture Outline:**

1. General characteristics of mycobacteria
2. Cultural and morphological features
3. Spectrum of infections caused by mycobacteria
4. Interpretation of Mantoux test
5. Diagnosis of pulmonary and extrapulmonary tuberculosis
6. Atypical Mycobacteria

**Main References:**

Refer to recommended textbooks

**Lecture Title:**  
**ANAEROBES (1HR)**

**Learning Outcomes:**

At the end of the course, the students should be able:

1. To describe the anaerobes and their growth requirements
2. To classify the medically important anaerobes
3. To list the important diseases associated with anaerobes.

**Lecture Outline:**

1. Historical aspect
2. Medically important anaerobes
  - i. Gram- positive non-sporing bacilli
  - ii. Gram- positive sporing bacilli
  - iii. Gram- negative bacilli
  - iv. Gram- negative and positive cocci
3. Habitat
4. Characteristics of anaerobic infection
5. Culture characteristics
6. Genus:
  - i. Clostridium
  - ii. Bacteroides
  - iii. Fusobacterium
  - iv. Peptococcus , Peptostreptococcus
  - v. Bifidobacterium, Propionibacterium, Eubacterium

For each genus, outline the

- a. important species and the diseases caused
- b. cultural characteristics and Gram stain morphology
- c. virulent factors
- d. important identification test eg. Stormy clot reaction and Nagler's test for *Clostridium perfringens*
- e. antibiotic sensitivity

**Main References:**

Refer to recommended text books list

**Lecture Title:**

**CORYNEBACTERIA, ACTINOMYCES, NOCARDIA, SPIROCHAETES, MYCOPLASMA, CHLAMYDIA AND RICKETTSIA (1 HOUR)**

**Learning Outcomes:**

At the end of the session, the students should be able to:

1. list the relevant medically important bacterial species
2. describe the basic important features of these organisms
3. describe the major diseases caused by these organisms
4. describe the diagnosis and treatment of diseases caused by these organisms

**Lecture Outline:**

1. Introduction to medically important bacterial species:

Corynebacteria: *C.diphtheriae*

Actinomyces: *A.israelii*

Listeria: *L. monocytogenes*

Nocardia: *N.asteroides*

Spirochaetes: *Treponema/Leptospira/Borrelia*

Mycoplasma: *Mycoplasma / Ureaplasma*

Chlamydiae : *Chlamydia trachomatis, Chlamydophila psittaci, Chlamydophila pneumoniae*

Rickettsiae: *Rickettsia/Orientia/Coxiella*

For each species mentioned above, the following aspects of the organisms will be described:

2. General characteristics
3. Laboratory identification
4. Epidemiology, diseases and transmission
5. Treatment and prevention
6. Antibiotic susceptibility

**Main References:**

Refer to recommended text books

**Lecture Title:**  
**MYCOLOGY 1 & 2 (1 HOUR)**

**Learning Outcomes:**

At the end of the course, the students should be able to:

1. Describe the taxonomy and nomenclature of medically important fungi
2. Describe the cultural characteristics of various fungal species.
3. Describe the microscopic morphology of medically important fungal species

**Lecture Outline:**

1. Introduction  
Characteristic of colonial morphology of yeasts, molds: texture, topography and color  
Microscopic characteristic of molds and yeasts  
Types of spores: asexual and sexual
2. Phylogenetic classification of clinically important fungi
3. Laboratory identification of fungal isolates:
  - direct microscopy and histopathology
  - Culture: colony characteristics and microscopy
  - Slide culture
  - Differential tests: carbohydrate assimilation tests, thermo-dimorphism, corn meal agar for spore production, germ-tube test
  - Serology
4. Characteristics of medically important fungi:
  - A. Perfect fungi (with sexual forms)
    1. Ascomycota - Sexual cells in ascus with ascospores.
    2. Basidiomycota -Sexual cells in a basidium with basidiospores.
    3. Zygomycota - sexual reproduction by gametes and asexual reproduction with the production of zygospores.
  - B. Imperfect fungi (Fungi Imperfecti)

No sexual reproduction includes most of the medically important fungi.

Two major classes:  
Blastomycetes: budding cells  
Hypomycetes

**Main References:**

Refer to recommended text books.

**Lecture Title:**  
**STERILISATION AND DISINFECTION ( 1 HOUR )**

**Learning Outcome:**

At the end of the course, students should be able to:

1. Define sterilisation and disinfection
2. State the methods of sterilization and disinfection, the factors affecting the efficacy of disinfectant, the application of sterilisation and disinfection in the health-care setting.

**Lecture Outline:**

1. Disinfection – definition and objectives, methods of disinfection, uses, advantages and disadvantages.
2. Methods of disinfection and its application
  - Heat (boiling, steaming, pasteurization)
  - Irradiation
  - Filtration
  - Chemicals – disinfectants / antiseptics
3. Factors affecting the efficacy of disinfectants
4. Sterilisation – definition and objectives, advantage and disadvantages
5. Methods of sterilisation and its application
  - Dry heat (hot air oven, flaming, incineration)
  - Moist heat (autoclave, tyndallisation)
  - Irradiation
  - Chemical – gaseous, liquid
  - Filtration
6. Monitoring the efficacy of sterilisation

**Main References:**

Refer to recommended text books.

**Lecture Title:**  
**VIROLOGY 1 & 2 (1 HOUR)**

**Learning Outcomes:**

At the end of the session, the students should be able to:

1. Describe the general biological and physical properties of viruses and how they differ from other infectious agents
2. Describe the virus structures and its functions, virus replication
3. Describe the virus classification and the major properties of DNA & RNA viruses
4. Apply the knowledge of effect of physical and chemical agents on viruses in inactivation of virus
5. Apply the knowledge of cultivation of virus in diagnosis
6. Discuss about viral pathogenesis and disease processes

**Lecture Outline:**

1. Differences between bacteria and virus
2. General properties of viruses
  - Size and method of determination
  - Physical and chemical structure of viruses
  - Viral genome and function
  - Viral structure and symmetry
3. Effect of physical and chemical agents
  - Heat and cold
  - Radiation
  - Ether and chloroform
  - Phenols and other inactivating compounds
  - pH
  - antibiotics and antivirals
4. Cultivation of viruses
  - Cell culture and cytopathic effect
  - Egg embryo and detection of growth
  - Laboratory animals
  - Mosquito inoculation
5. Replication of viruses
  - RNA viruses
  - DNA viruses
  - Retroviruses
6. Viral diseases and host response
  - Routes of entry
  - Organ specificity and cell receptors
  - Acute and latent infections
  - Symptomatic and asymptomatic infections
  - Non-specific defense mechanisms
  - Specific host response – antibody and cell-mediated responses

7. Basis of virus classification
  - Groups
  - Family
  - Serotype and genotype
  
8. Syndromic classification
  - Haemorrhagic fever
  - Hepatitis
  - Diarrhea
  - Neurologic symptoms
  - Exanthemata
  - Tumor
  - Respiratory

**Main References:**

Notes on Medical Microbiology (Timbury, Mc Cartney, Thakker and Ward)

Jawetz, Melnick and Adelberg's Medical Microbiology (Brooks, Butel, Morse)

Medical Microbiology and Immunology (Examination and Board review). Warren Levinson and Ernest Jawetz. Latest Edition.

**Lecture Title****INTRODUCTION TO IMMUNOLOGY AND INNATE IMMUNE RESPONSES ( 1 HOUR)****Learning Outcomes:**

At the end of the course students should be able:

1. To describe the basic pattern of the immune response
2. To state the types of immunity response
3. To state the cardinal features of the immune response
4. To describe the various components of the innate immune response

**Learning Outcomes:**

1. History – brief background
2. Basic Pattern of the immune response
3. Types of immunity
4. Natural versus Specific

**Specific Immunity – actively acquired / passively**

1. Active immunity
2. Passive immunity

**Cardinal Features of the Immune response**

1. Specificity
2. Diversity
3. Memory
4. Self Regulation
5. Discrimination between self and non-self

**Clonal Selection theory****Innate/Natural/Non-Adaptive Immune Responses:**

1. Mechanical Barriers
2. Chemical & Biochemical inhibitors
3. Cytokines
4. Physiology factors
5. Phagocytosis
6. Opsonization
7. Complement
8. Lymphocytic cells

**Complement**

2 pathways – classical & alternative  
Biological activation

Control

**Further reading:**

Mechanisms by which intracellular destruction of microorganisms by the phagocyte occurs  
Pathways of complement activation

**Main References:**

Essential Immunology by Ivan Roitt: Chapter 1  
Cellular & Molecular Immunology by Abbas, Lichtman & Pober  
Chapter 1, Chapter 15

## **Lecture Title**

### **ANATOMIC AND CELLULAR BASIS OF THE IMMUNE RESPONSE (1 HOUR)**

#### **Learning Outcomes:**

At the end of the course, the students should be able to:

1. Describe the main organs and cell involved in the stimulation and development of an immune response
2. Describe the circulatory routes taken by lymphocytes and why
3. Describe the basis of the Major Histocompatibility Complex

#### **Lecture Outline:**

##### **Organised architecture of structural organs/tissues**

Divide into 2 groups

Primary lymphoid organs

Secondary lymphoid organs

##### **Bone marrow & Thymus – 2 types of lymphoid cells**

Lymphoid cells – T, B, NK

Myeloid cells – mononuclear phagocytes, polymorphs

##### **Bone marrow**

Structure, development and maturation of B cells, differentiation

Hematopoietic Stem cell tree

B cell maturation

Stages in maturation, characteristics of B cells

Clonal Selection hypothesis

##### **Thymus**

Structure, T cell development – stages of maturation, differentiation, selection

Characteristics of T cells, subsets

Selection process

##### **Lymphocytes**

characteristics

##### **Myeloid Cells**

Development, maturation and principle function

##### **Secondary Lymphoid organs**

Lymph nodes, Spleen, GALT, MALT

Lymph nodes

Basic structure and function

Spleen

Basic Structure and Function

Other peripheral lymphoid

Lymph nodules – unencapsulated, scattered in aggregates

Beneath mucosa of GIT, RT

Peyer's patches, Tonsils in pharynx  
Submucosal follicles – appendix, upper airways, Mesenteric nodes  
Cutaneous sites  
    Epidermis, dermis  
Ectopic sites  
    Synovium

### **Lymphocyte Circulation**

Recognition of antigen by lymphocytes subpopulation  
2 mechanisms to maximize the efficiency of the specific arm  
Why the need for such a system  
Routes of circulation

### **MAJOR HISTOCOMPATIBILITY COMPLEX (MHC)**

Region of highly polymorphic genes whose products are expressed on a variety of cells  
Principle determinants of graft rejection

Discovery  
HLA or MHC antigens/molecules  
Tissue distribution  
Basic Structure  
Principle function  
Physiologic importance

### **Further reading :**

The structure of the MHC and how peptides bind to it  
How peptides are bound and presented by the different classes

### **Main References :**

Essential Immunology by Ivan Roitt : Chapter 6  
Cellular & Molecular Immunology by Abbas, Lichtman & Pober  
Chapter 2, 5, 11

## **Lecture Title: SPECIFIC IMMUNE RESPONSES I – HUMORAL IMMUNITY (1 HOUR)**

### **Learning Outcomes:**

At the end of the course the students should be able to:

1. State the main features and components of the Humoral arm of the immune response
2. Describe the development, maturation and activation of B cells
3. Describe the basic structure, classes and functions of antibody
4. State how the different classes are produced?
5. State how antibody diversity is generated?

### **Lecture Outline:**

Brief introduction into the dichotomy of the specific immune response  
Importance of the Humoral arm in defence against infections  
Features of the Humoral IR  
Effects of antigen on B cell  
Sequence of events  
Factors that determine nature of HI

### **IMMUNOGLOBULIN – ANTIBODY (Ab)**

Antiserum – basic characteristics

Basic structure

Other structures

Enzymatic digestion

**Classes of Ab** - basic structural characteristics and functions

### **Dual Function**

#### **Kinetics of Ab production**

First exposure                      PRIMARY Ab RESPONSE

Second exposure                  SECONDARY Ab RESPONSE

#### **Comparison of primary vs secondary IR**

#### **Effector functions of Ab**

#### **Generation of Ab diversity**

Functional set of VDJ segments encode both chains

How are antibodies produced

Mechanisms of generation of diversity

Heavy chain isotype class switching

Mature IgM & IgD expressing B cells –undergo H chain isotype switching , allowing progeny to produce antibodies of different classes

Mechanisms of class switching

Regulated by Th cells & their cytokines

### **Main References :**

Essential Immunology by Ivan Roitt : Chapter 3, 7

Cellular & Molecular Immunology by Abbas, Lichtman & Pober Chapter 3,4,5,9

**Lecture Title:****SPECIFIC IMMUNE RESPONSES II –CELL-MEDIATED IMMUNITY (1 HOUR)****Learning Outcomes:**

At the end of the course students should be able to:

1. Describe the basic features and components of the Cell-Mediated Immune Response
2. Describe the development and maturation and generation of diversity of T cells
3. Describe T cell activation
4. Discuss functions of the Cell-Mediated Immune response
5. Discuss the mucosal immune response

**Lecture Outline:****Definition****Development & Maturation of T cells**

Thymic education – identify and eliminate strongly self-reacting and non-reactive T cells

2 selection processes

T cell and its accessories

***Generation of diversity***

Functional  $\alpha$ ,  $\beta$  chains make up the TCR – formed by rearrangement of germline gene segments, each locus – V, J, C, and/or J region, Chromosome 7 & 14

Mechanisms of generation of diversity

Once TCR assembled – no further genetic alteration, no isotype switching, no somatic recombination, no affinity maturation

**Antigen Processing and Presentation**

Forms of antigen recognized, accessory cells, self-MHC restriction

Types and properties of Antigen Presenting Cells (APCs)

**T cell activation**

Series of cellular events

**Effector Functions of CMI****Mucosal Immune responses****Main References :**

Essential Immunology by Ivan Roitt : Chapter 3, 4, 7

Cellular & Molecular Immunology by Abbas, Lichtman & Pober

Chapter 6, 7, 8, 13

**Lecture Title:**  
**ASSESSMENT OF HOST DEFENCE SYSTEMS ( 1 HOUR )**

**Learning Outcomes:**

At the end of the course the students should be able to:

1. Describe interaction and forces between antigen and antibody
2. Describe methods of assessment of the innate immune response
3. Describe methods of assessment of the humoral arm
4. Describe methods of assessment of the cellular arm

**Lecture Outline:**

Interaction of antigen & antibody forms basis of

Assessing the level of immunity

Diagnosing illness

Verify safety of donated blood

Serology – methods used for both Ag & Ab

Basic event – binding, rarely visible

Secondary reaction – precipitation, agglutination, CFT, NT

Biological reaction in vivo

Intermolecular forces

Non-covalent – usually weak in cf to covalent bonds

Antibody affinity and avidity

**1. Assessment of innate immunity**

1. Serum complement
  - Ability to lyse antibody coated red cells – via activation of classical pathway
  - Ability to facilitate uptake of microbial particle by a phagocytic cell – opsonic ability
  - Individual complement components – lytic activity or gel ppt.
  - Phagocytic activity
  - NBT test
2. Cytokines
  - Flow cytometry
  - MRNA protection assays – detection of mRNA of cytokine
  - Immunohistochemistry
3. Production of Antibody
  - Polyclonal Ab, Monoclonal Ab, genetically engineered Ab, purification

**2. Assessment of humoral arm**

1. Precipitation
  - Ouchterlony, SRID, Rocket Electrophoresis, Immunoelectrophoresis etc
2. Agglutination
  - Coomb's test, CFT, HA, HI
3. Immunoassays
  - ELISAs, RIA

### **Detection of antigen**

1. Immunohistological reactions – on tissues  
Fluorescence, immunoblots
2. Newer methods – PCR based, Western blots

### **Assessment of cell mediated immune responses**

1. Flow cytometry – enumeration, separation
2. Function assays
3. Lymphocyte transformation
4. Lymphocyte cytotoxicity
5. Memory cell detection – ELISPOT assays
6. DTH responses

### **RELATIVE SENSITIVITIES OF TESTS MEASURING Ab**

#### **Main References :**

Essential Immunology by Ivan Roitt : Chapter 5  
Medical Microbiology by Mims, Playfair, Roitt, Wakelin & Williams,  
Chapter 14 Immunobiology – The immune system in health & Disease by Janeway-Travers,  
Chapter 2

**Lecture Title:**  
**ADVERSE IMMUNE RESPONSES (1 HOUR)**

**Learning Outcomes:**

At the end of the lecture, students should be able to:

1. Define hypersensitivity, and list the types I-IV
2. Describe the mechanisms of types I-IV hypersensitivity, with examples
3. Describe how tolerance is achieved in the immune system, and its importance

**Lecture Outline:**

1. Definition of hypersensitivity
2. Types I-IV hypersensitivity
  - a. Mechanisms
  - b. Example
3. Tolerance
  - a. Mechanisms
  - b. Breakdown of tolerance and autoimmunity
4. Superantigens

**Main References:**

Notes on Medical Microbiology by Timbury MC (Timbury MC, Mc Cartney AC, Thakker B, Ward KN.J. Douglas Sleigh and Morag Timbury) 2002 Elsevier health Sciences)  
Medical Microbiology and Immunology (Examination and Board review), Warren Levinson and Ernest Jawetz, 2004, mc Graw Hill  
Jawetz, Melnick and Adelberg's Medical Microbiology by GF Brooks (Brooks, Butel, Morse).  
Published 2007 McGraw-Hill Professional  
Medical Microbiology Updated 3<sup>rd</sup> edition, Mims, Dockrell, Goering, Roitt, Wakelin, Zuckerman

**Lecture Title:**  
**PATHOGENESIS OF MICROBIAL INFECTIONS I (1 HOUR)**

**Learning Outcomes:**

At the end of the course the students should be able to:

1. State the basic understanding of pathogenesis of microbial infections
2. State the obligatory steps in infection, various routes of entry into the host
3. State the routes of exit and transmission
4. State the routes of spread upon entry

**Lecture Outline:**

**Hosts** – have highly efficient means for recognizing pathogens

Effective inflammatory & IR – restrain growth, spread & to eliminate

If these were completely effective – infections would be rare!!

Every infection is a race between capacity of microbe to enter, multiply, spread, cause disease and ability of host to control and terminate infection

**Microbes** – developed variety of characteristics to ensure their survival

Generally association between 2 organisms

Parasitic

Commensal

Symbiotic

Maintain itself in nature, persist, multiply, spread, cause the smallest amount of damage, be discharged

**BALANCED PATHOGENECITY**

**PATHOGENESIS** –study of mechanisms by which microbes cause disease, process involves entry, local infection, multiplication, spread, cell/tissue damage, recovery or death or chronic infection

**OBLIGATORY STEPS**

**ENTRY OF MICROORGANISMS**

Must attach, penetrate all host's body surfaces

Sites of entry, host defence at site, mode of entry, examples

### **EXIT & TRANSMISSION**

Successful microbe must leave and infect fresh host

Exit from via same routes or via insect bites or animal bites

Transmission can occur via any route

Routes of transmission

### **SPREAD OF MICROORGANISMS**

Features of local or systemic spread and examples

Mechanisms of spread throughout the body

Factors affecting spread

### **Main References:**

Medical Microbiology by Mims, Playfair, Roitt, Wakelin & Williams, Chapter 7-10

**Lecture Title:**  
**PATHOGENESIS OF MICROBIAL INFECTIONS II (1 HOUR)**

**Learning Outcomes:**

At the end of the course, the students should be able to:

1. Describe the mechanisms of cell and tissue damage
2. Describe the parasite survival strategies – mechanisms by which microorganisms avoid the innate and specific arm of the immune response

**MECHANISMS OF CELL & TISSUE DAMAGE**

No cell or tissue damage, direct damage, examples  
MICROBIAL TOXIN

Exotoxins, Endotoxins  
Characteristics, examples and mode of action of exotoxins

**PATHOLOGIC ACTIVATION OF INNATE IR**

*Endotoxins - characteristics, examples and mode of action, biological effects*  
*Complement, Cytokines*

**PATHOLOGIC ACTIVATION OF SPECIFIC IR**

Via host immune responses  
*Hypersensitivity*  
Skin rashes – immunologically mediated involving a microbe

**Viruses & cancer**

*OTHER MECHANISMS OF DAMAGE*

**PARASITE SURVIVAL STRATEGIES**

Battery of host mechanisms – not 100% effective

Microbe has evolved answers to evade or interfere

**AVOID NATURAL IMMUNE DEFENCES**

Promote colonization, invasion & evade innate IR – virulence factor, its function, examples  
Avoid complement activity – mechanism and examples  
Avoid phagocytosis – mechanism and examples

## **AVOID SPECIFIC IMMUNE RESPONSES**

Principle strategies with examples

Concealment of antigen

Tolerance

Antigenic variation

Immunosuppression

Persistence

### **Main References:**

Medical Microbiology by Mims, Playfair, Roitt, Wakelin & Williams, Chapter 11-12

**Lecture Title:**

**PRINCIPLES OF ANTIMICROBIAL CHEMOTHERAPY 1,2,3 ( 3 HOURS )**

**Learning Outcomes**

At the end of the session, the student should be able to:

1. Explain the principles of selective toxicity
2. Describe the mechanisms of action of antimicrobials
3. List the major classes of antimicrobials agents and describe their modes of action
4. Explain the terms susceptible and resistant
5. Describe the mechanisms of antimicrobials resistance with examples and explain the genetic basis of resistance.
6. Describe the methods of determining the in-vitro activity of antimicrobials
7. State principles of antimicrobials use, state when combination of drugs are used, and the outcomes of using drugs in combination
8. Classify the various beta-lactam antimicrobials, explain their mechanisms of action, describe their spectrum of activity and basic pharmacokinetics , name their clinical uses and describe their possible major adverse reactions.
9. For the following classes of antimicrobials, to describe their mechanisms of action, state their spectrum of activity list their clinical uses, describe their basic pharmacokinetic properties and list common important side effects:

Classes:

Antibacterials

glycopeptides  
aminoglycosides  
sulphonamides  
repetition  
trimethoprim  
co-trimoxazole  
tetracyclines  
macrolides

Antifungals

Polyenes  
Azoles  
5-fluorocytosine  
Echinocandins

Antivirals

Anti-Herpes drugs (ex:acyclovir, foscarnet)  
Amantadine  
Ribavirin  
Interferon-alpha  
Anti-HIV drugs (brief introduction only)

1. Historical overview
2. Definition
  - a. Selective toxicity
  - b. Antibiotic
  - c. Chemotherapeutic agent
  - d. Bactericidal and bacteriostatic agents
  - e. Narrow-spectrum and broad-spectrum agents
3. Mechanisms of action of antimicrobials
  - Inhibit cell wall synthesis
  - Inhibit cell membrane function
  - Inhibition of protein synthesis
  - Inhibition of nucleic acid synthesis
4. Mechanisms of resistance
  - Ex:
    - a. Produce enzymes that destroy the drug
    - b. Change permeability to the drug
    - c. Develop altered structural target
    - d. Develop altered metabolic pathway
5. Origin of antimicrobial resistance
  - a. Intrinsic resistance
  - b. Acquired resistance
  - c. Chromosomal resistance
  - d. Extra chromosomal resistance
6. Methods of determining the antimicrobials in-vitro activity
  - a. Disc diffusion tests
  - b. Dilution tests
  - c. MIC/MBC

## **(B) BETA-LACTAMS AND GLYCOPEPTIDES**

1. Beta-lactams
  - Molecular structure of beta-lactam antibiotics
  - Classification of penicillins and cephalosporins
  - Mechanisms of action
  - Inhibition of bacterial cell-wall synthesis, peptidoglycan, Penicillin-binding proteins (PBP)
  - Mechanisms of resistance – beta-lactamase, altered PBP, altered OMP
  - Brief Pharmacokinetics
  - Adverse effects – especially Penicillin and Type 1 hypersensitivity
  - clinical uses
  - B-lactamase inhibitors – clavulanic acid, sulbactam, tazobactam

2. Glycopeptides (Vancomycin & Teicoplanin)
  - i. Mode of action and mechanism of resistance
  - ii. Pharmacokinetics (brief)
  - iii. Clinical uses
  - iv. Adverse reactions
  
3. Other antibacterial, antiviral and antifungal agents-mode of action / resistance (where discussed), spectrum, clinical use, important adverse reactions).

Antibacterial:

- Aminoglycosides
- Quinolones
- Sulphonamides, Trimethoprim, Cotrimoxazole
- Tetracyclines
- Macrolides

Anti-tuberculosis drugs

- Polyenes
- Azoles
- 5-fluorocytosine

Antivirals:

- Anti-Herpes drug (acyclovir, foscarnet)
- Anti-HIV drugs
- Amantidine
- Ribavirin
- Interferon-alfa
- Anti-HIV drugs (brief introduction)

**Main References:**

Notes on Medical Microbiology (Timbury, Mc Cartney, Thakker and Award)  
Jawetz, Melnick and Adelberg's Medical Microbiology (Brooks, Butel, Morse)  
Medical Microbiology and Immunology (Examination and Board review). Warren Levinson and Ernest Jawetz. Latest edition.

**Lecture Title:**  
**INFECTIVE ENDOCARDITIS ( 1 HOUR )**

**Learning Outcomes:**

At the end of the session, the students should be able:

1. Define the meaning of infective endocarditis and list the common organisms (aetiological agents) involved in the certain types (native valve, prosthetic valve, intravenous drug users)
2. Discuss the predisposing factors
3. Describe the pathogenesis of infective endocarditis
4. Discuss the microbiological diagnosis
5. Discuss the principles involved in antimicrobial therapy and prevention methods

**Lecture Outline:**

**1. Infective Endocarditis**

Definition and Importance

Factors predisposing to endocardial damage

Pathogenesis

Causative agents in relation to patient profiles

- i. Streptococci
- ii. Staphylococci
- iii. Gram negative bacilli
- iv. Yeast and Filamentous fungi
- v. Others

Culture-negative endocarditis

Microbial investigations

Principles of antimicrobial therapy

Prevention

**2. Myocarditis and Pericarditis**

Definition and importance

Causative agents in acute and chronic infections

Microbiological investigations

Antimicrobial therapy

**Main References:**

Notes on Medical Microbiology (Timbury, Mc Cartney, Thakker and Ward)

Medical Microbiology (Elliott, Hastings and Desselberger, 3<sup>rd</sup> edition).

Mandell, Douglas and Bennett's Principles and Practices of Infectious Diseases, 6<sup>th</sup> edition

**Lecture Title:**  
**RESPIRATORY TRACT INFECTIONS 1-3 ( 3 HOURS )**

**Learning Outcomes:**

At the end of the course, the students should be able to:

1. Discuss the role of the normal flora in the upper respiratory tract and its significance in the laboratory diagnosis of respiratory tract infections.
2. Discuss the important infections of the upper and lower respiratory tract in relation to its:
  - epidemiology
  - aetiology
  - pathogenesis
  - laboratory diagnosis
  - antimicrobial therapy
  - complications
  - prevention

**Lecture Outline:**

1. Defence mechanisms in the respiratory tract
2. Normal flora and carriage of respiratory pathogens
3. Infections and pathogens
  
4. Common cold
5. Acute pharyngitis/tonsillitis syndrome
6. Diphtheria
7. Vincent's angina
8. Otitis externa
9. Acute/chronic otitis media
10. Acute/chronic sinusitis
11. Whooping cough
12. Influenza
13. Acute epiglottitis
14. Acute laryngo-tracheo-bronchitis
15. Acute bronchitis
16. Acute exacerbations of chronic bronchitis
17. Acute bronchiolitis
18. Pneumonia
  - Community-acquired
  - Hospital-acquired
  - opportunistic
  - aspiration
  - primary atypical
  - chronic
19. Thoracic empyema

20. Lung abcess
21. SARS

**Main References:**

DC Shanson – Microbiology in clinical practice. Wright (latest edition)

**Lecture Title:**  
**VIRAL HEPATITIS I & II ( 2 HOURS )**

**Learning Outcomes:**

At the end of the course students should be able:

1. To describe the virology of viral hepatitis
2. To describe the serological markers used in the laboratory diagnosis of viral hepatitis and their clinical significance
3. To interpret the laboratory reports
4. To discuss the prevention and control of viral hepatitis

**Lecture Outline:**

1. Definition
  - Types of viral hepatitis
2. Virology
  - Nomenclature and features of hepatitis viruses
  - Genomic structures
3. Clinical presentations
  - typical clinical serological profiles and laboratory features
  - acute and chronic hepatitis
  - clinical significance of serological markers
  - chronic hepatitis and liver diseases
4. Epidemiology
  - modes of transmission
  - changes in viral hepatitis infections
5. Laboratory diagnosis
  - serological markers used in laboratory diagnosis
  - interpretation of laboratory reports
  - definition of chronic hepatitis carriers
  - monitoring of patients with chronic hepatitis B infection
6. Prevention and control
  - vaccines and Expanded Programme of Immunization (EPI)
  - the role of HBIG in preventing perinatal transmission
  - Emergence of HBV mutants and occult HBV infections

**Main References:**

Refer to recommended text books list.

**Lecture Title:**  
**GASTROINTESTINAL INFECTIONS 1, 2 & 3 (3 HOURS)**

**Lecture Outcomes:**

At the end of the course, students should be able to:

1. State the aetiological agents causing GIT infections
2. Discuss the pathogenic mechanisms, pathogenesis, clinical presentations
3. Describe the laboratory diagnosis, principle of management and antimicrobial therapy, complications and prognosis, epidemiology, prevention and vaccination.

**Lecture Outline:**

**GIT 1**

Brief Introduction:

Anatomy and physiology

Commensal flora

Pathogenic mechanisms

Diagnostic approach

Typhoid and enteric fevers

**GIT 2**

Bacillary dysentery and shigellosis

Cholera – Classical, El tor and Bengal

Food poisoning

**GIT 3**

Esch. coli diarrhoea

Viral diarrhea

Antibiotic-associated diarrhoea

**Main References:**

Refer to recommended list of text books.

**Lecture Title:**  
**URINARY TRACT INFECTIONS (UTI) ( 1 HOUR )**

**Learning Outcomes:**

At the end of the course, the students should be able to describe the presenting signs and symptoms and pathogenesis of upper and lower urinary tract infections and the interpretation of urine culture reports.

**Lecture outline:**

1. Terminology
2. Epidemiology of UTI
3. Normal flora of the anterior urethra
4. Concept of "Significant Bacteriuria"
5. Pathogenesis including predisposing factors
6. Microbial aetiology and virulence factors
7. Laboratory diagnosis – specimen collection and transport, microscopy, culture methods, viable counts (semi-quantitative methods)
8. Antimicrobial therapy

**Main References:**

Microbiology in Clinical Practice. DC Shanson. Wright PSG  
Medical Micro Updates (latest edition)

**Lecture Title:**  
**VIRAL HAEMORRHAGIC FEVERS ( 1 HOUR )**

**Learning Objectives:**

At the end of the lecture, students should be able to:

1. describe the epidemiology of dengue in Malaysia and the region
2. discuss the different clinical manifestations, management and pathogenesis of the disease
3. describe the different methods of laboratory diagnosis
4. discuss control and prevention of dengue

**Lecture Outline:**

1. Epidemiology
2. Clinical Manifestation
3. Virology
4. Pathogenesis
5. Laboratory Diagnosis
6. Control Measures

**Main References:**

Notes on Medical Microbiology by Timbury MC (Timbury MC, Mc Cartney AC, Thakker B, Ward KN.J. Douglas Sleight and Morag Timbury) (2002 Elsevier health Sciences)  
Medical Microbiology and Immunology (Examination and Board review). Warren Levinson and Ernest Jawetz.2004, Mc Graw Hill  
Jawetz, Melnick and Adelberg's Medical Microbiology by GF Brooks ( Brooks, Butel, Morse).  
Published 2007 McGraw-Hill Professional  
Medical Microbiology Updated 3<sup>rd</sup> edition. Mims, Dockrell, Goering, Roitt, Wakelin, Zuckerman  
Malavige GN *et al.* Dengue viral infections. *Postgrad Med J* 2004; 80: 588-601. (available free via PubMed or <http://pmj.bmj.com/content/full/80/948/588>)

**Lecture title:**

**HEALTH CARE ASSOCIATED INFECTION (NOSOCOMIAL INFECTION ( 1 HOUR )**

**Learning Outcomes:**

At the end of the course, students should be able to:

1. Define infections, discuss the modes of transmission of infections, state the pathogens involved.
2. Discuss the basic principles of prevention and infections.

**Lecture Title:**

Definition

Exogenous / endogenous sources

Modes of transmission

Common pathogens

Host factors, microbial factors

Prevention of hospital infections

- standard precautions
- transmission based precautions
- isolation precautions
- hand hygiene

Surveillance

- Infection Control Team/Committee

Control of outbreaks of infections

**Main References:**

Refer to recommended text books list.

**Lecture Title:**  
**INTRAUTERINE AND PERINATAL INFECTIONS (1 HOUR)**

**Learning Outcomes:**

At the end of the course, the students should be able to describe the spectrum of bacterial and viral neonatal infections acquired via different routes of transmission and the pathogenesis and prevention of important examples.

**Lecture Outline:**

Definition of neonatal, perinatal and intrauterine infections  
Defects in neonatal host defense system  
Pathogenesis and prevention  
Clinical and laboratory diagnosis  
Bacterial and viral pathogens

- Rubella
- Cytomegalovirus
- Herpes simplex virus
- Parvovirus B19
- Human papilloma virus
- Group B streptococcus

**Main References:**

Notes on Medical Microbiology  
Colour Atlas in Pediatrics Infectious Diseases. CA Hart, RL Broadhead. Principles and Practices of Infectious Diseases. Mandell, Douglas, Bennett. Wiley Medical

**Lecture Title:**  
**SEXUALLY TRANSMITTED INFECTIONS (STI) (2 Hours)**

**Learning Outcomes:**

At the end of the course, the students should be able to:

1. describe the usual presenting signs and symptoms of common STIs,
2. describe the spectrum of sexually-transmitted infections and etiologic agents,
3. state the pathogenesis and laboratory diagnosis of gonorrhoea, chlamydia and syphilis.

**Lecture Outline:**

Spectrum of infections and etiologic agents

Clinical presentations

Laboratory diagnosis

Syphilis

Gonorrhoea

Chlamydia

Herpes genitalis

LGV (Lymphogranuloma venereum)

Other genital ulcers

Bacterial vaginosis

**Main References:**

ABC of Sexually Transmitted Diseases. Michael Wadler. BMJ

Microbiology in Clinical Practice. DC Shanson. Wright, PSG

**Lecture Title:**  
**INFECTIONS OF THE CENTRAL NERVOUS SYSTEM ( 4 HOURS )**

**Learning Outcomes:**

At the end of the course, the students should be able to describe the bacterial and viral infections of the CNS and their

- aetiological agents
- clinical presentation
- pathogenesis
- laboratory diagnosis
- antimicrobial therapy
- complications and prognosis
- prophylaxis and prevention

**Lecture Outline:**

- Brief introduction
- The meninges
- CSF – secretion, exchange, normal constituents
- blood brain barrier

**Meningitis**

- acute pyogenic
- acute aseptic
- chronic
- recurrent

**Shunt infections**

**Brain abscess**

**Encephalitis**

- Acute –sporadic
- epidemic
- post-infectious
- non-acute (degenerative)

**Poliomyelitis**

**Rabies**

**Tetanus**

**Main References:**

Refer to recommended text books list.

**Lecture Title:**  
**INFECTIONS OF THE MUSCULO-SKELETAL SYSTEM ( 1 HOUR )**

**Learning Outcomes:**

At the end of the course, the students should be able to describe the bacteriology, pathogenesis, clinical presentation and investigations of gas gangrene, osteomyelitis and arthritis

**Lecture Outline:**

Definitions and common features of pyomyositis, psoas abscess, non-clostridial myositis

Gas gangrene: definition  
etiologic agents  
pathogenesis  
predisposing factors  
investigations  
prophylaxis and treatment

Osteomyelitis: pathogenesis  
Etiologic agents  
Acute and chronic osteomyelitis  
Investigations

Arthritis: pathogenesis  
predisposing factors  
examples of bacterial, viral, chronic granulomatous arthritis  
sterile/reactive/immunological arthritis  
laboratory investigations on joint fluids

**Main References:**

Microbiology in clinical Practice. DC Shanson. Wright, PSG

**Lecture Title:**  
**VIRAL EXANTHEMATA 1 &2 (2 HOURS)**

**Lecture Outcomes:**

At the end of the lecture, students should be able to:

1. classify viral exanthemata into papulovesicular and maculopapular rashes
2. describe the epidemiology, clinical manifestations, diagnosis, treatment, control and prevention of the common viral exanthemata

**Lecture Outline:**

For measles, rubella, HHV-6, HHV-7, parvovirus B19, HSV-1, HSV-2, VZV, and enteroviruses, the following information:

1. Virology
2. Epidemiology
3. Clinical manifestations
4. Mode of transmission
5. Laboratory diagnosis
6. Treatment, control and prevention

**Main References:**

Notes on Medical Microbiology by Timbury MC (Timbury MC, Mc Cartney AC, Thakker B, Ward KN.J. Douglas Sleight and Morag Timbury) (2002 Elsevier health Sciences)

Medical Microbiology and Immunology (Examination and Board review). Warren Levinson and Ernest Jawetz.2004, Mc Graw Hill

Jawetz, Melnick and Adelberg's Medical Microbiology by GF Brroks ( Brooks, Butel, Morse). Published 2007 McGraw-Hill Professional

Medical Microbiology Updated 3<sup>rd</sup> edition. Mims, Dockrell, Goering, Roitt, Wakelin, Zuckerman

**Lecture Title:**  
**PYREXIA OF UNKNOWN ORIGIN (PUO) 1,2 ( 2 HOURS )**

**Learning Outcomes:**

At the end of the course, the students should be able to:

1. Define PUO and give an overview of the infective causes of PUO
2. Describe specific infections that present as undifferentiated fevers, state methods for microbiological diagnosis, treatment and prevention : Rickettsial infection (including Orientia tsutsugamushi infection, Q fever, Leptospirosis, Brucellosis, and Borelliosis)

**Lecture Outline:**

Definition of PUO and an overview on the Infective causes

Specific infections which present as undifferentiated fevers with special emphasis on certain Rickettsioses (Scrub typhus, Endemic typhus, Q fever, examples of other spotted fever, Leptospirosis, Brucellosis, & Borelliosis)

Brief description of the pathogen  
Epidemiology  
Mechanisms of transmission to man  
Pathogenesis of disease  
Clinical presentation  
Laboratory diagnosis  
Antimicrobials used in therapy  
Problems in prevention of disease

**Main References:**

Notes on Medical Microbiology (J.Douglas Sleight and Morag Timbury)  
Jawetz, Melnick and Adelberg's Medical Microbiology (Brooks, Butel, Morse)  
Medical Microbiology and Immunology (Examination and Board review). Warren Levinson and Ernest Jawetz. Latest edition.

**Supplementary References:**

Mandell Douglas and Bennett's Principles and Practices of Infectious Diseases

**Lecture Title:**  
**PYREXIA OF UNKNOWN ORIGIN 3**

**Lecture Outcomes:**

At the end of the lecture, students should be able to:

1. Describe the epidemiology, clinical disease, diagnosis, treatment and control of melioidosis, infectious mononucleosis, and Chikungunya
2. Discuss the importance of melioidosis and Chikungunya in Malaysia

**Lecture Outline:**

For melioidosis, infectious mononucleosis, and Chikungunya, the following information:

1. Microbiology of causative organism
2. Epidemiology
3. Clinical manifestations
4. Mode of transmission
5. Laboratory diagnosis
6. Treatment, control and prevention

**Main References:**

Notes on Medical Microbiology by Timbury MC (Timbury MC, Mc Cartney AC, Thakker B, Ward KN.J. Douglas Sleight and Morag Timbury) (2002 Elsevier health Sciences)

Medical Microbiology and Immunology (Examination and Board review). Warren Levinson and Ernest Jawetz. 2004. Mc Graw Hill

Jawetz. Published and Adelberg's Medical Microbiology by GF Brooks (Brooks, Butel, Morse).

Published 2007 McGraw-Hill Professional

Medical Microbiology Updated 3<sup>rd</sup> edition. Mims, Dockrell, Goering, Roitt, Wakelin, Zuckerman

**Lecture Title:**  
**HIV INFECTION ( 1 HOUR )**

**Learning Outcomes:**

At the end of the course, the students should be able to describe the:

1. Virology and genomic structure of HIV
2. Laboratory diagnosis of HIV.
3. Clinical manifestations of HIV diseases.

**Lecture outline:**

1. Introduction  
Characteristics of Family Retrovirus
2. Nomenclature and molecular virology of HIV
  - structure of virus
  - genomic structure and associated viral proteins
  - HIV genotypes, CRF and URF
  - molecular basis of HIV mutations
  - Life-cycle of HIV: coreceptors, X4 and R5 virus
3. Clinical manifestations of HIV
  - classification of HIV disease
  - transmission of HIV disease
  - acute HIV syndrome, clinical latency and opportunistic infections in symptomatic HIV disease
4. Pathophysiology and pathogenesis
  - immunopathogenic events during HIV infections
  - immune response to HIV
5. Laboratory diagnosis of HIV disease
  - serological profile of HIV infections
  - WHO strategy on diagnosis of HIV disease Standard HIV screening tests in Malaysia
  - Laboratory monitoring of HIV infection
  - Diagnosis of pediatric HIV infection
6. Prevention and control
  - prevention of vertical transmission
  - drug therapy and emergence of drug resistant HIV mutants
  -

**Main References:**

HIV. In Harrison's Principles of Internal Medicine. 14<sup>th</sup> Edition. Page 1110 and 1791.

**Lecture Title:**  
**SEPTICAEMIA ( 1 HOUR )**

**Learning Objectives:**

At the end of the session, the students should be able to:

1. State the infections that may lead to septicaemia and their microbial aetiology
2. Describe briefly the pathophysiology of septicaemia shock and features of sepsis syndrome
3. Discuss the microbiological investigations in septicaemic patients
4. Discuss the principles of antimicrobial therapy in septicaemic patient

**Lecture Outline:**

1. Definition  
Bacteraemia  
Transient Bacteraemia  
Septicaemia
2. Pathogenesis of septicaemia in relation to  
-source  
-predisposing factors  
-microbial aetiology
3. Correlation between clinical feature of septicaemia and the pathophysiology of septicaemic shock.
4. Microbiological investigations of septicaemia
5. Principles of antimicrobial therapy

**Main References:**

Noted on Medical Microbiology (Timbury, Mc Cartney, Thakker and Ward)  
Jawetz, Melnick and Adelberg's Medical Microbiology (Brooks, Butel, Morse)  
Medical Microbiology and Immunology (Examination and Board review). Warren Levinson and Ernest Jawetz. Latest edition.  
Harrisons Principles of Internal Medicine

**Lecture Title:**  
**FUNGAL INFECTIONS 1 & 2 ( 2 HOURS )**

**Learning Outcomes:**

At the end of the course, the students should be able to:

1. Describe the clinical presentations, taxonomy and nomenclature of aetiological agents of superficial, cutaneous / subcutaneous mycosis and systemic fungal infections
2. Apply appropriate laboratory investigations and skills in identifying clinically important fungal isolates
3. List the of antifungal drugs and clinical applications

**Lecture Outline:**

Clinical classification of fungal infections

Overview of laboratory diagnosis: direct microscopy, histopathological and cultural methods

Skin mycology: Clinical presentations, common fungal pathogens, cultural and histopathological investigations of superficial, cutaneous and subcutaneous mycoses.

Infectious disease mycology: Opportunistic and dimorphic systemic mycoses. Clinical manifestations, common aetiological agents, appropriate laboratory methods in identifying the fungal pathogens

Treatment of fungal infections: current antifungal drugs and the clinical application.

**Main References:**

Refer to recommended text books lists.

**Lecture Title:**  
**IMMUNOLOGY OF INFECTIOUS DISEASES**

**Lecture Outcomes:**

At the end of the lecture, students should be able to:

1. List of components of the innate and adaptive immune responses
2. Describe how innate and adaptive immune responses work against infectious agents
3. List the different types of immunodeficiency, with examples
4. Describe the infections resulting from different immunodeficiency defects

**Lecture Outline:**

1. Innate defences – external
2. Innate defences – internal
  - Phagocytes
  - Natural killer cells
  - Eosinophils
  - Complement
  - Cytokines
  - Acute phase proteins
3. Adaptive defences – antibodies/ B cells
  - T cells
4. Immunodeficiency – defects in:
  - T cells
  - B cells
  - phagocytes
  - complement

**Main References:**

Notes on Medical Microbiology by Timbury MC (Timbury MC, Mc Cartney AC, Thakker B, Ward KN.J. Douglas Sleigh and Morag Timbury) (2002 Elsevier health Sciences)  
Medical Microbiology and Immunology (Examination and Board review). Warren Levinson and Ernest Jawetz.2004, Mc Graw Hill  
Jawetz, Melnick and Adelberg's Medical Microbiology by GF Brooks ( Brooks, Butel, Morse).  
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Medical Microbiology Updated 3<sup>rd</sup> edition. Mims, Dockrell, Goering, Roitt, Wakelin, Zuckerman