

Course Description Template for the subject | **Medical Microbiology**

University/College Name	AUIQ/ College of Medicine
Subject Name	Medical Microbiology
Academic Stage	Third Stage
Available Attendance Modes	Lecture and Discussion
Subject System	Yearly
Academic Year for Preparing this Description"	2023-2022

Syllabus of Medical Microbiology

Total theory: 90 hours

Part1: immunology

15 Hours Theory (1 Hours/ 15 Weeks)

8 Hours Practical (2 Hours/ 4 Weeks)..

Objectives:

The objective of this course is to learn the structural features of the components of the immune system as well as their functions during the immune response and its involvement in health and disease.

The primary aim of this course is understanding mechanisms involved in immune system development and responsiveness.

Teaching and learning methods:

Lectures, laboratory work.

Assessment: Homework, quizzes, examination, poster discussion.

Text books approved:

- 1) Medical Microbiology by Jawetz, Melnick 26th ed., 2013.
- 2) Immunology by kuby 5th ed., 2002.

3) Foundations in Microbiology by Talaro and Talaro 3rd ed., 2005.

Theoretical Lectures:

The week	The title	Lecture objective
1st week	The Nature of Host Defenses	To understanding of The series of defenses that protect us against invasion by harmful microbes and other foreignmatter. • Defenses development and specificity. •Three lines of defenses: 1st line chemical, physicaland genetic barriers. second line defenses such as phagocytosis, inflammation, complement system, and interferon and third line defenses: acquired immunity

<p>2nd week</p>	<p>Systems Involved in immune</p>	<p>To understanding of</p> <ul style="list-style-type: none"> • The systems that are most involved in immune function (the blood, lymphoid organs and tissues, and the RES). • White blood cells, types and formation in the red bone marrow. • Some of their complex functions relating to phagocytosis, inflammation, antibody production, and pathogen killing. • The lymphoid organs (spleen, lymph nodes, thymus, GALT, MALT) their importance in surveillance and immune reactions.
<p>3rd week</p>	<p>Nonspecific Immune Reactions</p>	<p>To understanding of</p> <ul style="list-style-type: none"> • Inflammation as protective response to injury. • Types of chemical mediators, that released by cells during inflammation and other immune responses. • Interferon is a nonspecific immune mediator that inhibits the replication of viruses and regulates a variety of immune responses. • The complement system sequentially reaction to lyse cells and viruses.
<p>4th week</p>	<p>Phagocytes</p>	<p>To understanding of</p> <ul style="list-style-type: none"> • Phagocytes as specialized cells that function in engulfment and clearance of foreign molecules, cells, viruses, and particles. <p>Their numerous enzymes and toxic chemicals to carry out phagocytosis function.</p>
<p>5th week</p>	<p>The Acquisition of Specific immunity</p>	<p>To understanding of</p> <p>Acquired specific immunities provided by B and T lymphocytes that protect us against infection and their role to survival.</p>

**6th
week**

**The origin
of diversity
and
specificity**

To understanding of

**•Genetically programmed cells to react with
foreign substances (antigens).**

**•Glycoprotein receptors that dictate
their specificity and reactivity.**

- B lymphocytes receptors, T lymphocytes receptors, and macrophages receptors such as MHC and HLA.

- Differentiation of lymphocytes that create of genetically different clones that each have a unique specificity for antigen.

- The B cells and T cell maturity and migration to lymphoid tissues.

- Antigens of foreign cells, viruses, and molecules that are capable of triggering immune reactions by lymphocytes.

- The B and T cells react with antigens through a complex series of mechanisms

7 th week	The Classes of Immunoglobulins	<p>To understanding of</p> <ul style="list-style-type: none"> • B cells activated by antigen giving rise to plasmacells that secrete antibodies (humoral immunity) and long lived memory cells. • Antibodies binding sites and their roles in agglutination, opsonization, complement fixation, and neutralization. • The amount of antibodies during immediate and memory reactions.
8 th week	Immunization and vaccination	<p>To understanding of</p> <ul style="list-style-type: none"> • The categories of natural, artificial, active, and passive immunities. • Powerful medical tools to artificially induce protective immunities. • Immunization by means of passive and active methods. • Vaccines types: dead or live cells and viruses, parts of cells or viruses, or by recombinant DNA techniques.
9 th week	Serological and immune tests	<p>To understanding of</p> <ul style="list-style-type: none"> • Reactions between antibodies and antigens that can be used in diagnosis of disease and identification of pathogens.

- Serology testing of a patient's blood serum that can indicate a current or past infection and the degree of immunity.

- Tests that produce visible interactions of antibodies and antigens include agglutination, precipitation, and complement fixation.

10th week	Serological and immune tests	<p>To understanding of</p> <ul style="list-style-type: none"> • Assays can be used to separate antigens and antibodies and visualize them with radioactivity or fluorescence (such as immunoelectrophoresis, Western blot, and direct and indirect immunoassays).
11th week	Disorders in Immunity	<p>To understanding of</p> <ul style="list-style-type: none"> • The several types of dysfunctions (immunopathologies). • The dysfunctions that are due to abnormally heightened responses to antigens (allergies, hypersensitivities, and autoimmunities). • The dysfunctions that are due to the reduction or loss in protective immune reactions due to genetic or environmental causes such as (immunodeficiencies and cancer).
12th week	Disorders in Immunity	<p>To understanding of</p> <ul style="list-style-type: none"> • Some immune damage that caused by normal actions that directed at foreign tissues placed in the body for therapy, such as transfusions and transplants. • Hypersensitivities divisions into immediate, antibody-mediated, immune complex, and delayed allergies. • Allergens that cause a hypersensitive or allergic response.
13th week	Disorders in Immunity	<p>To understanding of</p> <ul style="list-style-type: none"> • The immediate type of allergy that mediated by special types of B cells that produce IgE. • IgE inducing mast cells to release allergic chemicals such as histamine.
14th week	Disorder s in	<p>To understanding of</p> <ul style="list-style-type: none"> • Examples of immediate allergies are atopy, asthma, food allergies, and

	Im mun ity	anaphylaxis.
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<ul style="list-style-type: none"> • Another type of hypersensitivity arises from the reaction of other antibodies (IgG and IgM) that can fix complement and lyse foreign cells. • Immune complex reactions that caused by circulating antibodies against foreign molecules and their accumulating in tissues and organs. 		
15 th week	Disorders in Immunity	<p>To understanding of</p> <ul style="list-style-type: none"> • Autoimmune diseases. <p>The production of B and T cells that sensitized to react with the body's natural molecules. Some examples of these diseases (rheumatoid arthritis, systemic lupus erythematosus, myasthenia gravis, and multiple sclerosis).</p> <ul style="list-style-type: none"> • T cells in delayed-type hypersensitivities.
16 th week	Immunodeficiency diseases	<p>To understanding of</p> <ul style="list-style-type: none"> • Immunodeficiencies pathologies in which B and T cells and other immune cells are missing or destroyed. • The primary outcome of immunodeficiencies as recurrent infections and lack of immune competence.
17 th week	Cancer	<p>To understanding of</p> <p>Cancer as an abnormal overgrowth of cells due to a genetic defect and the lack of effective immune surveillance.</p>

Practical sessions

1. Introduction to Immunology laboratory
2. Antibody-Antigen (Ab-Ag) reaction (hemagglutination)
3. (Ab-Ag) reaction (precipitation)
4. Electrophoretic Techniques (Immunoelectrophoresis)
5. Ab-Ag reaction (complement fixation)
6. Ab-Ag reaction (ELISA) and Immunoblot.
7. Ab-Ag reaction (Immunofluorescence test and Radio immune assay)
8. Cell isolation, Cell counting and functional assessment

Part 2: bacteriology curriculum

60 Hours Theory (2 Hours/ 30 Weeks)

**50 Hours Practical (2 Hours/ 25Weeks)..Lecturer: Dr. Hayder Kh.
Shnan; Dr. Saad Abdil Aziz Atia; Dr. Zainab D. Dgaim**

Objectives:

The objective of this course is to learn the basic and systematic microbiology especially medical bacteriology.

The primary aim of this course is understanding characteristic structures and pathogenicity of medical bacteriology as well as methods of diagnosis and understanding new procedures of prevention, and treatments of diseases.

Teaching and learning methods:

Lectures, laboratory work.

Assessment: Homeworks, quizzes, examination, poster discussion.

Theoretical Lectures:

The week	The title	Lecture objective
1 st week	Introduction of medical microbiology and bacterial structures	To understanding of 1-Science of medical microbiology. 2-Structures of bacterial cell envelope. 3-Nuclear materials, plasmid and transposons
		4- Study the external appendages and endospores
2 nd week	Bacterial genetics and gene transfer	To understanding of 1- Science of genetics 2- DNA and RNA types 3- Mutations 4- Methods of gene transfer
3 rd week	Host-pathogen relations	To understanding of 1- Infectious process 2- Attachment of microbial agent with host cell. 3- Invasion process 4- Antiphagocytic factors 5- Intracellular pathogenicity
4 th week	Sterilization and disinfection	To understanding of 1- Methods of sterilization and disinfection 2- Physical process 3- Chemical process

5th week	Antimicrobial therapy	To understanding of 1- Types of antibiotics 2- Mode of its action 3- Methods of resistance 4- Origin of drug resistance 5- Side effects of antibiotic
6th week	Staphylococci species	To understanding of • The Staphylococci characteristics. • Morphology and Identification.
		• Antigenic Structure.
		• Pathogenesis.
		• Pathology.
		• Clinical Findings.
		• Diagnostic Laboratory Tests
		• Treatment.
		• Epidemiology, Prevention, & Control.
7th week	Streptococci species	To understanding of • The Streptococci characteristics. • Morphology and Identification. • Antigenic Structure. • Pathogenesis. • Pathology. • Clinical Findings. • Diagnostic Laboratory Tests • Treatment. • Epidemiology, Prevention, & Control.
8th week	Neisseria species	To understanding of • The <i>Neisseria</i> characteristics. • Morphology and Identification. • Antigenic Structure. • Pathogenesis. • Pathology. • Clinical Findings. • Diagnostic Laboratory Tests • Treatment. • Epidemiology, Prevention, & Control.

9th week	<i>Campylobacter</i> species	To understanding of <ul style="list-style-type: none">• The <i>Campylobacter</i> characteristics.• Morphology and Identification.
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		<ul style="list-style-type: none"> • Antigenic Structure. • Pathogenesis. • Pathology. • Clinical Findings. • Diagnostic Laboratory Tests • Treatment. • Epidemiology, Prevention, & Control.
10th week	<i>Helicobacter pylori</i>	<p>To understanding of</p> <ul style="list-style-type: none"> • The <i>H. pylori</i> characteristics. • Morphology and Identification. • Antigenic Structure. • Pathogenesis. • Pathology. • Clinical Findings. • Diagnostic Laboratory Tests • Treatment. • Epidemiology, Prevention, & Control.
11th week	<i>Legionella</i> species	<p>To understanding of</p> <ul style="list-style-type: none"> • The <i>Legionella</i> characteristics. • Morphology and Identification. • Antigenic Structure. • Pathogenesis. • Pathology. • Clinical Findings. • Diagnostic Laboratory Tests • Treatment. • Epidemiology, Prevention, & Control.
12th week	<i>Listeria</i> species	<p>To understanding of</p> <ul style="list-style-type: none"> • The <i>Listeria</i> characteristics. • Morphology and Identification. • Antigenic Structure. • Pathogenesis. • Pathology. • Clinical Findings. • Diagnostic Laboratory Tests • Treatment. • Epidemiology, Prevention, & Control.
13th week	The Vibrios	<p>To understanding of</p> <ul style="list-style-type: none"> • The Vibrios characteristics. • Morphology and Identification. • Antigenic Structure. • Pathogenesis. • Pathology.

		<ul style="list-style-type: none"> • Clinical Findings. • Diagnostic Laboratory Tests • Treatment. • Epidemiology, Prevention, & Control.
14th	<i>Corynebacteriu</i>	To understanding of
week	<i>m</i>	<ul style="list-style-type: none"> • The <i>Corynebacterium</i> characteristics. • Morphology and Identification. • Antigenic Structure. • Pathogenesis. • Pathology. • Clinical Findings. • Diagnostic Laboratory Tests • Treatment. • Epidemiology, Prevention, & Control.
15th	Rickettsia and	To understanding of
week	Related Genera	<ul style="list-style-type: none"> • The Rickettsia characteristics. • Morphology and Identification. • Antigenic Structure. • Pathogenesis. • Pathology. • Clinical Findings. • Diagnostic Laboratory Tests • Treatment. • Epidemiology, Prevention, & Control.
16th	<i>Brucellae</i>	To understanding of
week		<ul style="list-style-type: none"> • The <i>Brucellae</i> characteristics. • Morphology and Identification. • Antigenic Structure. • Pathogenesis. • Pathology. • Clinical Findings. • Diagnostic Laboratory Tests • Treatment. • Epidemiology, Prevention, & Control.
17, 18th	Enteric Gram	To understanding of
Week	Negative Rods	<ul style="list-style-type: none"> • The Enteric Gram Negative Rods characteristics. • Morphology and Identification. • Antigenic Structure. • Pathogenesis.
	(E. coli,	

	klebsiel la, proteus ,	<ul style="list-style-type: none">• Pathology.• Clinical Findings.• Diagnostic Laboratory Tests• Treatment.
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	pseudomonas, provencia group) Salmonel la, Shigella	• Epidemiology, Prevention, & Control.
19th week	<i>Acinetobacter</i> species	To understanding of • The <i>Acinetobacter</i> characteristics. • Morphology and Identification. • Antigenic Structure. • Pathogenesis. • Pathology. • Clinical Findings. • Diagnostic Laboratory Tests • Treatment. • Epidemiology, Prevention, & Control.
20,21th week	Complex aerobic Actinomycetes	To understanding of • The Actinomycetes characteristics. • Morphology and Identification. • Antigenic Structure. • Pathogenesis. • Pathology. • Clinical Findings. • Diagnostic Laboratory Tests • Treatment. • Epidemiology, Prevention, & Control.
22th week	Mycobacteria	To understanding of • The Mycobacteria characteristics. • Morphology and Identification. • Antigenic Structure. • Pathogenesis. • Pathology. • Clinical Findings. • Diagnostic Laboratory Tests • Treatment. • Epidemiology, Prevention, & Control.
23th week	<i>Bacillus</i> genus	To understanding of • The <i>Bacillus</i> characteristics. • Morphology and Identification. • Antigenic Structure.

		• Pathogenesis.
		• Pathology.

<ul style="list-style-type: none"> • Clinical Findings. • Diagnostic Laboratory Tests • Treatment. • Epidemiology, Prevention, & Control. 		
24 ^t h we ek	<i>Clostridium</i> genus	To understanding of <ul style="list-style-type: none"> • The <i>Clostridium</i> characteristics. • Morphology and Identification. • Antigenic Structure. • Pathogenesis. • Pathology. • Clinical Findings. • Diagnostic Laboratory Tests • Treatment. • Epidemiology, Prevention, & Control.
25 ^t h we ek	Borella, Leptospira	To understanding of <ul style="list-style-type: none"> • The Borella, Leptospira characteristics. • Morphology and Identification. • Antigenic Structure. • Pathogenesis. • Pathology. • Clinical Findings. • Diagnostic Laboratory Tests • Treatment. • Epidemiology, Prevention, & Control.
26 ^h week	Spirochaetes : T . pallidum,	To understanding of <ul style="list-style-type: none"> • The Spirochaetes : T . pallidum, Borella, Leptospira characteristics. • Morphology and Identification. • Antigenic Structure. • Pathogenesis. • Pathology. • Clinical Findings. • Diagnostic Laboratory Tests • Treatment. • Epidemiology, Prevention, & Control.
27,28 th Week	Pasterurella : Hemophilic , Bordetella	To understanding of <ul style="list-style-type: none"> • The Pasterurella : Hemophilic , Bordetella characteristics. • Morphology and Identification. • Antigenic Structure. • Pathogenesis. • Pathology. • Clinical Findings.

<ul style="list-style-type: none"> • Diagnostic Laboratory Tests • Treatment. • Epidemiology, Prevention, & Control. 		
29,30 th week	<ul style="list-style-type: none"> • Chlamydia, normal microbial flora of human body 	To understanding of <ul style="list-style-type: none"> • The Chlamydia, normal microbial flora of human body characteristics. • Morphology and Identification. • Antigenic Structure. • Pathogenesis. • Pathology. • Clinical Findings. • Diagnostic Laboratory Tests • Treatment. • Epidemiology, Prevention, & Control.

Practical sessions

- 1-Tools and biosafety
- 2-Sterilization
- 3-Antibiotic susceptibility test
- 4-Methods of bacterial counting and measuring bacterial growth
- 5-Bacterial staining
- 6-Culturing media
- 7-Growth characteristics
- 8-General urine examination
- 9-Biochemical tests
- 10-Staphylococci
- 11-Streptococci
- 12-*Neisseriae*
- 13-Aerobic spore-forming bacilli
- 14-Anaerobic spore-forming bacilli
- 15-Enterobacteriaceae
- 16-Non-Lactose Fermentors
- 17-*Pseudomonas aeruginosa*
- 18-*Vibrio*
- 19-*Listeria*
- 20-*Legionella*
- 21-*Helicobacter*
- 22-*Corynebacterium* and *Mycobacterium*

Part3: Virology curriculum

19 Hours Theory (1 Hours/ 19 Weeks)

10 Hours Practical (2 Hours/ 5 Weeks)..Lecturer: Dr. Mohammed Jasim Mohammed

Objectives:

The objective of this course is to learn about the general characteristics, structure, replication and properties of RNA and DNA viruses in addition to a view of the differences among viruses and other pathogens as well as the physical and chemical factors affected viruses. Also, it includes an overview of the most important viral diseases affected human with focus on their diagnosis, treatment and prevention.

The primary aim of this course is to make easy for student to understand what are viruses and how they can distinguish the viral infection in a way that increase their knowledge

Teaching and learning methods:

Lectures, laboratory work.

Assessment: Homework, quizzes, examination, poster and mini-research discussion.

References: Main book: Medical Microbiology, **Jawetz, Melnick** 26th ed.,2013

Theoretical Lectures:

The week	The title	Lecture objective
1st week	Virology introduction-properties and classification	To understanding of the follwings 1-General properties of viruses.2-Define structure of viruses. 3- classification of RNA and DNA viruses. 4- Evolutionary Origin of Viruses and Universal System of Virus Taxonomy.
2nd week	Chemical composition of viruses	To understanding of the define compartment of virus which includes Viral protein, viral nucleic acid, viral lipid envelopes, viral glycoproteins, cultivation and assay of viruses, detection of virus-infected cells, Quantitation of viruses,physical andbiologic methods.

3rd week	Reaction of viruses to physical and chemical agents	To understanding of different physical and chemical factors affected viruses such as 1-Heat & Cold, 2- Stabilization of Viruses by Salts
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3-pH, 4-Radiation, 5-Photodynamic inactivation, 6-Ether Susceptibility, 7-Detergents, Formaldehyde, Antibiotics & Other Antibacterial Agents,

4th week	Replication of Viruses: Virus Growth Cycle	To understanding of <ul style="list-style-type: none"> • An Overview of Replication of RNA and DNA viruses, • General Steps in Viral Replication Cycles,
5th week	Expression of Viral Genomes and Synthesis of Viral Components	To understanding of 1- Morphogenesis and Release, 2- Genetics of Animal Viruses, Viral Vectors,
6th week	Pathogenesis of Viral Diseases	To understanding of 1- Pathogenesis of Viral Diseases: 2- Steps in Viral Pathogenesis, 3- Viral Persistence: Chronic & Latent Virus Infections
7th week	Viral infections(1)	To understanding of 1- Overview of Acute Viral Respiratory Infections, 2- Overview of Viral Infections of the GIT,
8th week	Viral infections(2)	To understanding of 1- Overview of Viral Skin Infections, 2- Overview of Viral Infections of the CNS, 3- Overview of Congenital Viral Infections, 4- Effect of Host Age
9th week	rubella and other congenital viral infections	To understanding of 1- Transmission & Epidemiology, 2- Pathogenesis & Immunity, 3- Clinical Findings, 4- congenital rubella syndrome (CRS), Lab Diagnosis, Treatment, Prevention, Diagnosis of Congenital viral infections

1 0 t h w e e k	RNA non- enveloped Picornavirus es enteroviruse	To understanding of 1- Properties of Picornaviruse Picornavirus Replicatio 2- enteroviruses, Poliovirus, 3- Pathogenesis, Pathology, Clinical Findings, Laboratory Diagnosis,
1 1 t h w e e k	Coxsackievirus e s	To understanding of 1- Coxsackieviruses and their Clinical Findings,

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rhinoviruses		Transmission & Epidemiology, 2- RHINOVIRUSES and their Transmission & Epidemiology 3- Group B Specific Diseases: echoviruses
12 th week	Rotaviruses and some examples of different viruses	To understanding of 1- Pathogenesis, clinical findings, lab diagnosis, epidemiology, treatment and control, 2- Caliciviruses, 3- Astroviruses, 4- Viruses cause GIT infections, 5- Overview on Viruses that cause Common cold, 6- Overview on Viruses that cause lower respiratory tract infections, 7- Overview on Viruses that cause Genital tract and sexually transmitted Infections.
13 th week	Rabies virus and other CNS Viral infections	To understanding of 1- Rabies virus and Properties of the Rabies Virus, 2- Rabies Virus Replication, 3- Rabies 4- Pathogenesis & Pathology, Clinical Findings, Laboratory Diagnosis, Prevention, Treatment & Control, Other Viral CNS infections,
14 th week	Hepatitis A-E Viruses: An Overview (1)	To understanding of 1- Types of Hepatitis and General Characteristics of Hepatitis Viruses, 2- Hepatitis A Virus, 3- Transmission & Epidemiology, Pathogenesis & Immunity, 4- Clinical finding Treatment & Prevention, Lab Diagnosis,
15 th week	Hepatitis A-E Viruses: An Overview (2)	To understanding of 1- Hepatitis B Virus, 2- Transmission & Epidemiology, Replication, Pathogenesis & Immunity, clinical findings, lab diagnosis, treatment, prevention, 3- hepatitis C virus (HCV), Hepatitis C Life Cycle, Transmission & Epidemiology Pathogenesis & Immunity, Clinical Findings, lab diagnosis, treatment, prevention

16th week	Hepatitis A-E Viruses: An Overview (3)	To understanding of 1-Hepatitis D Virus, 2- Transmission and Epidemiology, Hepatitis D – 3- Clinical Features, lab diagnosis, treatment and prevention, Hepatitis EVirus,
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17th week	Herpesvirus	To understanding of 1-Introduction, important properties of herpesviruses, Structure & Composition, 2- Classification, Herpesvirus Replication, 3- Overview of Herpesvirus Diseases, 4-Properties of the Viruses, Pathogenesis & Pathology, Primary Infection, Latent Infection, Clinical Findings, 5- Oropharyngeal Disease, 6- Keratoconjunctivitis, 7- Neonatal Herpes, Infections in Immunocompromised Hosts, lab diagnosis,
18th week	Chemotherapy of viruses, antiviral agents, vaccines	1- To understand all mechanisms followed by different Types of antiviral chemotherapies, 2- To know about the different kinds of vaccines used for prevention of viral infections
19th week	Measles and mumps viruses	Introduction, important properties of measles and mumps viruses, pathogenesis, clinical findings, lab diagnosis, treatment, prevention, types of vaccines.

Practical sessions

The week	The title	Lecture objective
1st week	Introduction	To understanding of the following What is the virus ??, Methods of Diagnosing Viral Infections, Surface protein of the virus,
2nd week	Virus Isolation Using three living systems	To understanding of the Isolation of the virus using three living systems, Lab Animals, Chick embryo, tissue culture
3rd week	Types of tissue cultures	To understanding of Primary tissue culture, advantages, disadvantages Semi-continuous cell cultures, advantages, disadvantages, Continuous (Cell line), advantages, disadvantages, examples of isolated viruses (SARS- infected Vero cells)

4th week	Demonstration Tissue Culture used for virus isolation	To understanding of <ul style="list-style-type: none"><li data-bbox="655 241 1278 331">• Preparation of primary tissue culture, procedure, Counting of cells
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**5th
week**

**Inoculation
of clinical
sample in
living system**

A-Inoculation of clinical sample in tissue culture,how to harvest Rabbit kidney for tissue culture, procedure, Inoculation of clinical sample in tissueculture, Recognition of virus growth,

Part4: mycology (4 hours)

- Interoduction, Actinomyces and Nocardia
- Dermatophytes, Candida
- Cryllococcus
- Histoplasma and Sporotrichosis
- Miscellaneous fungi: Aspergiliosis , Penicillium, Rhizopus
- Antifungal agents, Antibiotic produced by fungi