**JINNAH SINDH MEDICAL UNIVERSITY**

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<thead>
<tr>
<th>MODULE TITLE</th>
<th>Foundation- 2, 2021</th>
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**INTRODUCTION**

This module has been designed to introduce students to basic concepts essential for understanding a number of issues related to diseases process, their prevention and treatment. It is hoped that learners will be able to apply these key concepts in future, system-based modules to understand the diseases processes and their management.

**RATIONALE**

In the 2nd spiral, before students go on to complex issues related to organ systems, it becomes necessary for them to have clear concepts underlying them. This module is designed so that it proceeds from simple to more complex basic issues. Concepts dealt with in this module will be revisited in many other modules in the future.

**TARGET STUDENTS**

Third year M.B.B.S., 2021

**DURATION**

weeks

**MODULE OUTCOMES**

By the end of the module, students should be able to describe main concepts from each of the disciplines taught

**DEPARTMENTS**

Biochemistry, Community Medicine, Forensic Medicine & Toxicology, Pathology & Microbiology, Pharmacology

**OBJECTIVES**

By the end of the module, students will be able to:

**BIOCHEMISTRY**

1 Basic concepts of genetics
   - Discuss the basic concepts of genetics including DNA and RNA structure, Mendel’s Laws of inheritance and Pedigree Chart

2 DNA Replication and repair
   - Describe the process of DNA Replication and repair

3 Transcription and Post Transcriptional Modification
   - Explain the mechanism of Transcription and Post Transcriptional Modification

4 Translation and Post Translational Modification
   - Discuss the process of Translation and Post Translational Modification

**COMMUNITY MEDICINE**

1 Introduction to public health
   - define common terminologies used in Community Medicine including C.O.M.E (Community Oriented Medical Education) & Comprehensive Health Care
   - briefly describe historical development of Public Health
   - discuss development of public health in Indo- Pakistan
   - discuss Health Plans and Social Action Program
   - discuss major Health Problems in the region and globally

2 Introduction to environmental health (climate change & global warming included)
<table>
<thead>
<tr>
<th>Section</th>
<th>Topics</th>
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</table>
| 3 | **Concept of disease causation** (determinants, dynamics of disease & iceberg):  
- discuss the concept of disease causation  
- list determinants of disease  
- describe dynamics of disease  
- discuss iceberg phenomenon |
| 4 | **Natural history of disease & Levels of prevention:**  
- discuss the phenomenon of natural history of disease & different levels of prevention |
| 5 | **International health agencies**- WHO, UNICEF etc.  
- list Regional Offices of WHO  
- discuss functions of WHO & of UNICEF  
- discuss UNICEF’s GOBI-FFF program |
| 6 | **Health Care System (Quality of health care +health system of Pakistan included):**  
- define District Health System and Health District.  
- explain Health Systems Development  
- discuss the Situation Analysis by studying Health Indicators and Health Needs.  
- list the following:  
  1. Health System Problems,  
  2. Public Health Engineering,  
  3. Financial and Organizational problems  
  4. problems of Health Planning, Evaluation and Research  
  5. primary aims of Integrated Health  
- identify Services and Resources, Health Facilities and Health Manpower.  
- describe major problems of Rural and Urban Health Areas of Pakistan.  
- describe Quality of Care.  
- explain Multi-sectoral Interaction and Partnership  
- describe the role of District Management Team. |
| 7 | **Primary Health Care:**  
- discuss the concept of Primary Health Care and its essential components  
- describe guidelines in PHC Planning. |
| 8 | **Dynamics of Disease:**  
- describe the dynamics of disease transmission  
- discuss direct and indirect transmission  
- list factors facilitating occurrence of disease |
| 9 | **Nuclear medicine:**  
- describe the basic concepts involved in radiation process |
10 Genomics:
- define genomics
- differentiate between genetics and genomics
- discuss Genotype And Phenotype
- discuss Public Health Or Community Genetics
- describe the role of Public Health practitioners in Genomics

11 Introduction to demography (demographic transition included):
- define demography
- list the tools of demography
- describe Age-Sex Composition by Population Pyramid & its Importance
- explain the Four Patterns of population change
- discuss the stages of demographic transition

12 Vital Statistics:
- Discuss the role of vital statistics in health status of country.
- Describe Vital statistics registration in developing countries.
- Describe the situation of vital statistics in Pakistan.

13 Morbidity & mortality determinants:
- calculate and interpret different mortality and morbidity indicators
- describe Special Indicators – Infant and maternal mortality rates

14 Population pyramid & interpretation:
- define the concept of Population pyramid
- compare the advantages and disadvantages of population pyramid

15 Introduction to infections & control of infections:
- define the following terms: infection, infestation, infection agent, control, elimination and eradication, agent, host and environment
- discuss the role of incubation period, serial time period in control of infection.
- describe the epidemiological triangle
- differentiate between infectious and communicable diseases.
- differentiate between disinfection and sterilization.
- describe control measures for infectious & communicable diseases.
- explain the role of immune-prophylaxis & screening in the control of infection

16 Introduction to occupational health, diseases & prevention
- define occupational health
- enumerate the common occupational health issues in Pakistan.
- discuss the control and prevention of occupational health hazards
<table>
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<th>JINNAH SINDH MEDICAL UNIVERSITY</th>
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</table>
| • explain the role of government in the prevention of occupational health hazards  
• describe the steps in risk prevention on hazards in the work-place  
• explain the common Occupational Diseases  
• explain the health hazards related to occupations  
• enumerate the steps for health hazard identification  
• differentiate between Risk of Health hazard identification and Risk management |
| 17 Ergonomics  
• discuss the concept of ergonomics  
• list different Ergonomic Risk Factors  
• list different types of Musculoskeletal Disorders |
| 18 Emerging & Re-emerging diseases:  
• name the different emerging diseases  
• describe the etiology, epidemiology, risk factors, control and prevention of emerging And re-emerging diseases |
| 19 Disease screening & Surveillance:  
• define Disease Surveillance  
• discuss the Key concepts of Disease surveillance  
• discuss the uses and methods of disease surveillance |
| 20 Health Information, Education and Communication (IEC):  
• define Health Management Information System & Health Education  
• identify the components of Health Management Information System  
• discuss the need of Health Management Information System in Primary Care Programs  
• explain the important features of Health Management Information System  
• explain the principles and stages of health education  
• discuss health education in Pakistan |
| 21 Waste Disposal:  
• differentiate between various terminologies like refuse, sewage and sullage  
• describe the various ways to collect and dispose human excreta and advise best method in given situation  
• explain the water carriage system  
• differentiate between sludge and sullage  
• state the advantages of different types of Sewage Treatment Plants |

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<th>FORENSIC MEDICINE</th>
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| 1. Introductory lecture  
• describe basics terms related to Forensic Medicine and Toxicology  
• enumerate the branches of Forensic Sciences  
• explain the importance and utility of Forensic Medicine and its branches in medical, legal and ethical issues |
• discuss the structure of Legal system and the powers of different courts in Pakistan

2. Legal Procedures - I
• define important legal terms such as Summons, warrant, perjury, deposition, exhibit, offence, cognizable offence, non cognizable offence, oath, conduct money, summons case, warrant case, bail, FIR
• explain medical evidence and its types (oral, documentary, hearsay, circumstantial)
• list the documents prepared by a medical man (Post mortem Reports, Medico Legal Reports, Certificates such as birth certificates, death certificates, sickness certificates, certificates of unsoundness of mind)
• differentiate between Dying declaration and Dying deposition

3. Legal Procedures – II
At the end of the lecture, the students will be able to describe:
• describe the types of witnesses
• describe the procedure of examination in the court
• describe the conduct of Doctor in the witness box, during court attendance & recording evidence and volunteering of a statement by the doctor in court of law
• discuss the concepts of professional secrecy and privileged communication

4. Legal Procedures – III
describe the following:
  i. Criminal Justice system in Pakistan
  ii. Pakistan Penal Code
  iii. Criminal Procedure Code; its execution and delivery
  iv. General presumptions of law and General exemptions of law

5. Thanatology - I
• describe scientific concepts regarding death
• explain Medico-legal aspects of brain death
• describe Howard’s criteria of death
• describe cause, manner, mode and mechanism of death
• describe Medico-legal aspects of sudden & unexpected deaths

6. Thanatology - II
• define Suspended animation
• explain immediate signs of death with special stress on somatic or clinical death
• summarize postmortem changes in the eyes
• describe early changes after death such as Algor Mortis (Cooling of the body), physio-chemical changes in various body tissues and organs under various environmental conditions after death
7. **Thanatology - III**  
- describe Postmortem Lividity (Livor mortis, Hypostasis or Suggilation) and its significance  
- describe changes in the blood, CSF, Vitreous humor and Bone marrow after death

8. **Thanatology - IV**  
By the end of the lecture, the students will be able to describe;  
- describe Late signs of death i.e. Putrefaction, its mechanism, changes and gases of decomposition  
- describe Forensic entomology, Adipocere formation & Mummification

9. **Thanatology - V**  
- describe presumption of death & Presumption of survivor-ship  
- explain the content of Certification of death according to WHO  
- describe the process of estimation of time since death

10. **Autopsy - I**  
- define autopsy and its types  
- list its aims and objectives  
- difference between Medico legal and Pathological autopsy  
- explain Autopsy protocols

11. **Autopsy - II**  
- describe External examination & types of incisions  
- describe Techniques of autopsy, Negative and Obscure autopsy  
- describe the process of internal examination of head

12. **Autopsy - III**  
- describe Internal examination of thoracic and abdominal cavities  
- explain the process of dissection of respiratory tract, heart, abdominal viscera, pelvic organs, and Spinal cord

13. **Autopsy - IV**  
- describe method of preservation of viscera for chemical and histo-pathological examination  
- list the preservatives used in mortuary  
- define Exhumation and Postmortem artifacts

14. **Traumatology - I**  
- define Injury, Hurt, Wound, Assault and Battery  
- classify Injuries  
- describe blunt weapon injuries; Abrasions and Bruises

15. **Traumatology – II**
16. Traumatology – III
At the end of the lecture, the students will be able to describe Qisas and Diyat Act with interpretation of injuries accordingly.

17. Mass Disasters
define the following:
  i. Mass disasters according to World Health Organization
  ii. Various methods of identification of victims
  iii. Triage and its types i.e. Simple, Advance and Reverse

18. Custodial deaths and torture
- define torture according to World Medical Association (Declaration of Tokyo)
- enumerate deaths in custody
- explain various torture techniques
- list the sequelae of torture
- describe the role of medical practitioner and the ethical issues with relation to torture

19. Infanticide (Pediatric Forensic Medicine - I)
- define infanticide, feticide, still born baby and dead born baby
- discuss Maceration
- list the methods of foetal age estimation
- summarize the signs of live birth
- define Precipitate labor/Unconscious delivery
- list the criminal causes of death of new born babies i.e. Acts of commission and omission
- explain autopsy on bodies of new born babies

20. Battered Baby (Pediatric Forensic Medicine-II)
- discuss Battered Baby Syndrome, its etiology and clinical features
- describe injuries and mechanism related to Shaken Baby Syndrome
- describe COT death (Sudden Infant Death Syndrome) and various possibilities of death with postmortem findings
- explain the medico-legal importance of SIDS

21. Animal Poisons- Toxicology (Snakes And Scorpions )
- classify snakes
- differentiate between poisonous and non-poisonous snakes
- differentiate between Colubridae and Viperidea
- summarize the signs and symptoms of bites by cobra and viper
<table>
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<tr>
<th>22. Thermal Injuries (Burns, scalds)</th>
<th>23. Environmental (Cold/heat) trauma</th>
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<tbody>
<tr>
<td>explain the principles of treatment of snake bite and Anti-venom therapy</td>
<td>describe the causes, clinical features and treatment of injuries due to local exposure to cold; Frostbite, trench foot, chilblain</td>
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<tr>
<td>list the medico legal aspects of snakebite</td>
<td>explain hypothermia; its causes, clinical features and treatment</td>
</tr>
<tr>
<td>discuss the signs, symptoms and treatment of Scorpion bite</td>
<td>discuss injuries due to general exposure to heat viz. Heatstroke, exhaustion, cramps; their causes, clinical features and treatment</td>
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<tr>
<td>24. Electrocution</td>
<td>25. Starvation</td>
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<tr>
<td>discuss the features of injuries due to various types of electrical current.</td>
<td>explain the types, signs and symptoms and postmortem findings of starvation</td>
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<tr>
<td>describe the causes of death due to electrocution.</td>
<td>26. General Toxicology</td>
</tr>
<tr>
<td>explain the features of lightning injuries and lightning deaths.</td>
<td>define Toxicology</td>
</tr>
<tr>
<td>27. General Toxicology</td>
<td>classify poisons based on: chief symptoms and medico legal criteria</td>
</tr>
<tr>
<td>define a poison.</td>
<td>explain the International toxicity rating of poisons</td>
</tr>
<tr>
<td>differentiate between poison and a medicine.</td>
<td>28. General Toxicology</td>
</tr>
<tr>
<td>explain routes of administration and excretion of poisons.</td>
<td>list the factors that modify action of poisons.</td>
</tr>
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<td>explain the diagnosis of poisoning in living &amp; dead</td>
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### GENERAL PATHOLOGY
**CELLULAR RESPONSES TO STRESS AND TOXIC INSULTS: ADAPTATION, INJURY, AND DEATH**

#### 1 Introduction to Pathology Overview: Cellular Responses to Stress and Noxious Stimuli
- Define Pathology and Pathogenesis.
- Briefly discuss cellular responses to the injury and stages of the cellular response to stress and injurious stimuli.

#### 2 Adaptation of Cellular Growth and Differentiation
- Define adaptation, hypertrophy, hyperplasia, atrophy, and metaplasia.
- Describe the causes and mechanism of hypertrophy, hyperplasia, atrophy, and metaplasia.

#### 3 Overview of Cell Injury and Cell Death
- List causes of cell injury.
- Discuss morphological alterations in cell injury including both reversible and irreversible injury.

#### 4 Mechanism of Cell Injury and Examples
- Describe Mechanisms of Cell Injury including Depletion of ATP, Mitochondrial damage, Influx of Calcium, Accumulation of Oxygen derived free radicals, Defects in membrane permeability, Damage to DNA and Proteins.
- Discuss properties of the Principal Free Radicals Involved in Cell Injury.
- Describe the process of Autophagy.

#### 5 Apoptosis and Necrosis
- Discuss causes, morphological and biochemical changes, clinic-pathologic correlations in Apoptosis.
- Summarize the pathways of apoptosis.
- Discuss morphologically distinct patterns of necrosis including coagulative necrosis, liquefactive necrosis, gangrenous necrosis, caseous necrosis, Fat necrosis, and fibrinoid necrosis.
- Briefly discuss Necroptosis.

#### 6 Intracellular Accumulations
- Summarize the pathways of abnormal accumulation.
- Discuss types of pigments (exogenous and endogenous).
- Describe hyaline changes, lipid, protein, and glycogen accumulation.
INFLAMMATION AND REPAIR
7 Introduction to Inflammation & Acute inflammation
- Define inflammation
- Classify inflammation
- List the causes of inflammation
- Discuss the sequence of events in acute inflammatory process

8 Mediators of acute inflammation
- Name the main inflammatory mediators
- Describe their role in the inflammatory process

9 Morphological pattern & outcomes of acute inflammation
- Explain different morphological pattern of acute inflammation
- List the outcomes of acute inflammation

10 Chronic Inflammation
- Define chronic inflammation
- List the causes and morphological features of chronic inflammation
- Describe the cells and mediators & their role in chronic inflammation
- Describe the systemic effects of inflammation

11 Granulomatous Inflammation
- Define granulomatous inflammation
- List the types of granulomatous inflammation
- List the diseases with granulomatous inflammation
- Discuss morphology of granulomatous inflammation

12 Tissue repair
- Define tissue repair
- Describe the mechanism involved in tissue regeneration and scar formation
- List the factors that influence tissue repair

13 Healing by First & Second Intention
- Contrast repair by primary and secondary intention
- Describe the complications in tissue repair

HEMODYNAMICS AND SHOCK
14 Edema, Effusion, Hyperemia and Congestion
- Define edema, effusion, exudate, transudate, hyperemia and congestion
- Define various terminologies according to morphology of edema & effusion
- Discuss the pathophysiologic categories of edema
- Describe the mechanism & clinical significance of edema at different sites
- Describe the morphological changes in chronic passive congestion of the lungs & liver
15 Hemostasis
- Define hemostasis
- Describe the sequence of events involved in primary & secondary hemostasis including the role of platelets, endothelium & coagulation cascade
- Describe the defects of primary & secondary hemostasis

16 Thrombosis & Embolism
- Define embolus, infarction
- Describe the factors that predispose to thrombosis
- Describe the morphologic features of thrombi
- List the possible fate of thrombus
- Describe the clinical features of venous, arterial & cardiac thrombosis
- Define Disseminated Intravascular Coagulation (DIC)
- Describe the pathogenesis of DIC
- List the types of embolism
- Describe the clinical manifestations & consequences of pulmonary & systemic thromboembolism
- Discuss the clinical conditions that give rise to fat & marrow embolism, air embolism & amniotic fluid embolism
- Classify infarction
- Describe the morphologic features of red & white infarct
- List the factors that influence development of infarct

17 Shock
- Define shock
- List the three major types of shock
- Describe the mechanism of three major types of shock
- Discuss the factors involved in the pathophysiology of septic shock
- Describe the three stages of shock
- List the clinical features of shock

GENETICS
18 Introduction to Mendelian Disorders
- Discuss the transmission pattern of single gene disorder
- Discuss the pathogenesis of important autosomal recessive, autosomal dominant, and X-linked disorders
- List the examples of Autosomal Dominant Disorders, Autosomal Recessive Disorders.

19 Mutation
- Define mutation
- Briefly discuss principles relating to the effects of gene mutation
- Distinguish between types of mutations in the coding and non-coding regions of genes

20 Single Gene Disorders
- Define single-gene disorders
- List types of single-gene disorders on the molecular and biochemical basis
- Discuss disorders associated with defects in structural proteins (Marfan’s & Ehlers-Danlos syndrome)
- Discuss disorders associated with defects in receptor proteins (Familial Hypercholesterolemia)
- Name types of lysosomal & glycogen storage diseases with their deficient enzymes

### 21 Chromosomal Disorders
- Define normal karyotype and common cytogenetic terminology
- Discuss structural chromosomal abnormalities
- Discuss Cytogenetic Disorders Involving Autosomes including Trisomy 21: Down Syndrome, Trisomy 18: Edwards Syndrome, Trisomy 13: Patau Syndrome
- Name diseases with deletion of genes at chromosomal locus 22q11.2 (DiGeorge syndrome, Velocardiofacial syndrome)
- Discuss Cytogenetic Disorders Involving Sex Chromosomes including Klinefelter syndrome, Turner syndrome

### 22 Molecular Genetic Disorders and Diagnosis
- List the indications for analysis of Inherited Genetic Alterations
- Summarise the basic principles of recombinant genetic techniques (PCR, FISH, RFLP, BLOTTING) and their applications in the detection of genetic diseases

### IMMUNOLOGY
#### 23 Introduction & Innate immunity
- Define immunity
- Classify types of immunity according to their function
- List the components of immune system
- Discuss the functions of immune system especially innate immunity
- Discuss the role of T cells, B cells, natural killer cells, macrophages in immunity
- Discuss the specificity of the immune response.
- Discuss properties, components & pattern recognition receptors.

#### 24 Adaptive immunity (I)
- Define adaptive immunity
- Classify T cells according to its types.
- Discuss the functions of CD4 and CD8 T cells with respect to activation, costimulation and memory formation
- Discuss the effect of superantigens on T cells

#### 25 Adaptive immunity (II)
- Define adaptive immunity
- Discuss the mode of activation of B cells
- Discuss effector functions of B cells
- Define antibody
- Discuss the structure of antibody
- Classify antibodies according to types
- Define primary response and secondary response of antibodies
- Discuss the functions of antibodies

26 MHC & transplantation
- Define Major Histocompatibility Complex (MHC)
- Classify MHC proteins according to its classes
- Define transplantation
- Discuss the importance of MHC in transplantation
- Classify types of transplant rejections
- Define allograft rejection
- Discuss HLA typing in the lab in association with transplantation

27 Complement System
- Define complement system
- Discuss complement system with respect to activation and regulation
- Discuss the role of complement in immunity
- Explain the clinical aspects of complement system

28 Hypersensitivity I & II
- Define Hypersensitivity reaction, desensitization, atopy, drug hypersensitivity
- Classify hypersensitivity according to its types
- Discuss the pathogenesis of types I & II hypersensitivity
- Discuss various clinical presentations of type I & II hypersensitivity reactions
- Discuss the treatment and prevention of types I & II hypersensitivity

29 Hypersensitivity III & IV
- Define Arthus reaction, Serum Sickness, Immune Complex Disease
- Discuss the pathogenesis of type III & IV hypersensitivity
- Discuss various clinical presentations of type III & IV hypersensitivity reactions
- Discuss the treatment and prevention of type III & IV hypersensitivity
- Discuss briefly Agglutination & precipitations reactions, ELISA
- Discuss ABO blood groups, transfusion reactions & Rh-incompatibility.

30 Tolerance and Autoimmune Disease
- Define T & B cell tolerance, autoimmunity
- Discuss the pathogenesis of autoimmune disease
- Discuss various clinical presentations of autoimmune diseases

31 Immunodeficiencies
- Define immunodeficiency
- Classify immunodeficiency according to its types
- Discuss various clinical presentations of immunodeficiency diseases

NEOPLASIA
32 Introduction to Neoplasia
- Define neoplasia
- Discuss Nomenclature of benign and malignant tumors with respect to tissue of origin
- Describe characteristic features of benign & malignant tumors

**33 Gross & Microscopy of Benign & Malignant tumors**
- Define Anaplasia, Metaplasia, Dysplasia, Metastasis
- Define cell Differentiation and de-differentiation
- Discuss all the components and morphological features of anaplasia
- Discuss Local Invasion of tumors
- Discuss Pathways of Spread of malignant tumors
- Compare features of Benign and Malignant Tumors

**34 Epidemiology of Cancer**
- Discuss the global impact of cancer
- List the Environmental Factors involved in the pathogenesis of malignancy
- Discuss different types of occupational cancers
- Define Acquired Predisposing Conditions leading to cancer development.
- Discuss association between Chronic Inflammatory States and Cancer
- Discuss the role of genetic predisposition and Interactions between Environmental and Inherited factors in cancer development

**35 Molecular Basis of cancer I**
- List Four classes of normal regulatory genes with respect to neoplasia
- Discuss Stepwise Accumulation of driver and passenger mutations
- Describe Cellular and Molecular Hallmarks of Cancer
- Define oncogenes
- Define Proto-oncogenes, and Oncoproteins
- Classify oncogenes according to their mode of action and associated tumors

**36 Molecular Basis of cancer II**
- Define Tumor Suppressor Genes
- Classify tumor suppressor genes according to their mode of action and associated tumors
- Discuss RB gene with respect to its role in tumor development
- Discuss p53 gene with respect to its role in tumor development

**37 Molecular Basis of cancer III**
- Define the Warburg Effect and angiogenesis
- Define Evasion of Programmed Cell Death (Apoptosis)
- Discuss the Stem Cell–Like Properties of Cancer Cells
- Discuss the effect of angiogenesis on tumor progression
- Discuss local Invasion and distant metastasis in neoplastic lesions
- Explain the molecular basis of Multistep-Carcinogenesis

**38 Grading, staging & clinical effects of Neoplasia**
• Define Grading and Staging of Tumors
• Define Cancer Cachexia
• Classify Paraneoplastic Syndromes according to their clinical effects and association with various tumors
• Discuss different types of Laboratory investigations used for Diagnosis of Cancer

39 Tumor markers & carcinogenic agents
• Define Chemical Carcinogenesis, Radiation Carcinogenesis, Microbial Carcinogenesis
• Classify chemical and radiation carcinogens according to their types and modes of action
• Classify microbial carcinogenesis according to the Viral and Bacterial involvement
• Classify Tumor Markers according to types and mode of action

II. GENERAL MICROBIOLOGY
1 Introduction to Microbiology
• Define microbiology
• Differentiate between prokaryotes and eukaryotes
• Discuss the types of microorganisms

2 Bacterial structure I
• Discuss the difference between gram-positive and gram-negative bacteria
• Describe the different shapes & staining procedure for bacteria.
• Differentiate among various bacteria based on their shapes
• Discuss the essential components of bacterial structure (cell wall, plasma membrane, cytoplasm, plasmid, transposons, nucleoid, mesosomes, periplasm)

3 Bacterial structure II
• Describe the non-essential components of the bacterial structure (capsule, spore, pili, plasmid, flagellum, granules, glycocalyx)
• Explain the growth cycle
• Differentiate between aerobic and anaerobic growth
• Describe Obligate intracellular growth, Fermentation of sugars, Iron metabolism

4 Bacterial genetics
• Discuss Mutations
• Describe the process of transfer of DNA within and between bacterial cells
• Discuss the importance of recombination

5 Classification of Bacteria and Normal Human Microbiome
• Discuss the principles of classification
• Classify Bacteria
• Discuss the concepts in normal microbiota of various areas of the body
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<th><strong>6 Pathogenesis I</strong></th>
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<tbody>
<tr>
<td>Describe the Principles of pathogenesis,</td>
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<tr>
<td>List the types of bacterial infection,</td>
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<tr>
<td>Explain the stages of bacterial pathogenesis,</td>
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<tr>
<td>Discuss the determinants of bacterial pathogenesis (Transmission, adherence, invasion)</td>
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<tr>
<th><strong>7 Pathogenesis II</strong></th>
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<tbody>
<tr>
<td>Discuss the determinants of bacterial pathogenesis, (Toxin production eg. exotoxin, endotoxin),</td>
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<tr>
<td>Discuss bacterial infection associated with cancer,</td>
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<tr>
<td>Describe the stages of infectious disease,</td>
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<tr>
<td>Describe the importance of Koch’s postulates</td>
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<th><strong>8 Host defence</strong></th>
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<tr>
<td>Discuss the Principles of host defence, innate immunity (skin and mucous membrane)</td>
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<tr>
<td>Describe the processes of Inflammatory response, phagocytosis and adaptive specific immunity</td>
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<th><strong>9 Sterilization and Disinfection</strong></th>
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<tr>
<td>Discuss the principles of sterilization and disinfection</td>
</tr>
<tr>
<td>Describe the Chemical agents of disinfection</td>
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<tr>
<td>Describe the physical agents of disinfection and autoclaving</td>
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<th><strong>10 Vaccines (Bacterial)</strong></th>
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<tbody>
<tr>
<td>Explain the principles of bacterial vaccines</td>
</tr>
<tr>
<td>Differentiate between active immunity and passive immunity</td>
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**VIROLOGY**

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<th><strong>11 Basic Virology &amp; Classification</strong></th>
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<tbody>
<tr>
<td>Compare viruses and cells</td>
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<tr>
<td>Classify viruses</td>
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<td>Discuss size and shape of viruses</td>
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<th><strong>12 Replication</strong></th>
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<tr>
<td>Describe viral growth curve</td>
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<td>Describe specific events during the growth cycle</td>
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<tr>
<td>Discuss Lysogeny</td>
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<tr>
<th><strong>13 Viral Pathogenesis &amp; host defence</strong></th>
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<tbody>
<tr>
<td>Describe Transmission and portal of entry of virus</td>
</tr>
<tr>
<td>Differentiate Pathogenesis and immunopathogenesis</td>
</tr>
<tr>
<td>Differentiate Nonspecific defences and specific defences</td>
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**MYCOLOGY**

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<th><strong>14 Basic Mycology</strong></th>
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<td>Describe the structure and growth of fungi</td>
</tr>
<tr>
<td>PHARMACOLOGY</td>
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</tbody>
</table>
| **1 Introduction to Pharmacology** | • Discuss the branches of Pharmacology and Therapeutics with their application  
  • Define terminology of Pharmacokinetics and Dynamics |
| **2 Routes of drugs administration** | • Classify routes of drug administrations  
  • Explain advantages and disadvantages of different routes of administration |
| **3 Source of drugs active principle** | • Discuss sources of drug synthesis and explain their active principles  
  • Explain different types of drug doses and their effects |
| **4 Drug Absorption & Bioavailability & Factors** | • Discuss different processes of drug permeation through biological membranes  
  • Explain drug absorption and bioavailability, and factors affecting on these both |
| **5 Drugs Distribution, volume of Distribution & PPB** | • Define drug distribution and Vd  
  • Discuss factors affecting it  
  • Explain plasma protein binding and its influence on drug distribution |
| **6 Biotransformation of drugs** | • Describe principles of drug biotransformation, metabolic reactions, phase-I & phase-II and their catalyzing enzymes |
| **7 Biotransformation & factors affecting** | • Explain different factors which affect the process of drug biotransformation |
8 Pharmacology of drugs excretion & factor affecting the excretion
   - Define kinetics of drug excretion, routes of drug excretion and
   - Discuss factors affecting drug excretion

9 Steady State Concentration and Kinetics of Drug Elimination
   - Define drug clearance, drug elimination and half-life
   - explain kinetics of drug clearance and drug elimination.
   - Explain Css and its achievement.
   - Calculate half-life
   - Discuss the of half-life and relation with drug dosing

10 Drug Receptors
   - Explain types of drug receptors, their properties
   - Discuss different mechanisms by which we obtain the
     therapeutic effect of the drugs

11 Mechanism of drug actions
   - Explain modes of action of different drugs at the molecular
     level
   - Discuss its classification

12 Dose response relationship and factors
   - Discuss the drug dose relationships to the drug effect and their
     graphic presentations
   - Describe the following terms: potency, efficacy, TI.

13 Adverse Drug Reactions
   - Discuss drug side effects, toxic effects and their types with
     examples

14 Drug-Drug Interaction
   - Explain types of drug interactions
   - Discuss the Pharmacokinetics and Pharmacodynamics
     interactions; summation, potentiation, synergism, additive
     effects and antagonism with examples

TUTORIALS

FORENSIC MEDICINE
General Toxicology
   - discuss the role of poisoning Information Centre in treatment
     of cases of poisoning

Autopsy hazards
   - discuss the hazards related to autopsy and the methods to
     prevent these hazards.

Crime scene investigation
   - discuss the important aspects of crime scene investigation.

PHARMACOLOGY
Terms & Abbreviations used in Pharmacology
### PRACTICALS

<table>
<thead>
<tr>
<th><strong>Dosage formed Drugs</strong></th>
<th>Explain the clinical usage, classification and properties of different drug dosage forms</th>
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<tbody>
<tr>
<td><strong>Standard format of prescription writing</strong></td>
<td>Discuss the importance and method of standard format of prescription writing</td>
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</tbody>
</table>
| **Drug-dosage calculation** | Explain the different formulas used to calculate the drug dosage  
Calculate the doses of drugs for patients of different ages and weight |

<table>
<thead>
<tr>
<th><strong>FORENSIC MEDICINE</strong></th>
<th><strong>Postmortem report writing/ Autopsy Protocols</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>At the end of the tutorial, the students will be able to write a Postmortem Report.</td>
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</table>

| **Traumatology** | At the end of the tutorial, the students will be able to write medico-legal report of an injured person. |

<table>
<thead>
<tr>
<th><strong>PATHOLOGY</strong></th>
<th><strong>Cell Adaptations</strong></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Differentiate among hypertrophy, hyperplasia, atrophy, metaplasia based on slides shown</td>
</tr>
</tbody>
</table>

| **Apoptosis and Necrosis** | Differentiate between necrosis and apoptosis based on the slides shown  
Identify morphologic changes in cell injury culminating in necrosis and apoptosis  
Discuss morphologically distinct patterns of necrosis including coagulative necrosis, liquefactive necrosis, gangrenous necrosis, caseous necrosis, Fat necrosis, and fibrinoid necrosis |

<table>
<thead>
<tr>
<th><strong>MICROBIOLOGY</strong></th>
<th><strong>Use of microscope for the identification of bacteria</strong></th>
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|                  | Identify different parts of microscope  
Use identification of histopathological specimens and micro-organisms |

<table>
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<tr>
<th></th>
<th><strong>Simple staining</strong></th>
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</table>
• Name different kinds of stains and staining techniques
  • Perform simple staining

Gram Staining
• Discuss the rationale and uses of performing gram staining
  • Perform gram staining

Spore staining & Capsule staining
• Perform Spore & Capsule staining

Motility test, Specialized structures & extensions outside cell wall
• Perform motility test
  • Name the specialized structures & extensions outside cell wall

Sterilization & Disinfection
• Identify the apparatus for Sterilization & Disinfection
  • Discuss the uses of various disinfectants

Catalase and Coagulase tests
• Perform Catalase and coagulase tests
  • Discuss the importance and relevance of these tests

Culture Media
• Name the various culture media required for bacterial identification
  • Discuss the properties, characteristics and relevance of various culture media

How to culture and perform Antibiotic Susceptibility Test (AST)
• Discuss the process of how to culture and perform Antibiotic susceptibility test
  • Describe the importance and relevance of AST

Types of hemolysis on Blood Agar
• Describe the types of hemolysis on blood agar for identification of micro-organism
  • Describe the importance and relevance of hemolysis on blood agar

Examination of Pus, Ulcer material and skin specimens
• Discuss the process of examination of Pus, ulcer material and skin specimens

PHARMACOLOGY

Preparation of Physiological Salt Solutions (Tyrode, Ringer, Kerb`s and De-Jalon`s solution)
• Demonstrate different types of Physiological Salt Solutions used in clinical practice and their composition for viability of living tissue.
  • Explain the method to calculate the doses of different solutes to prepare those solutions used clinically
Preparation of ORS and 5% dextrose solution
- Demonstrate different types of solutions used in clinical practice and their composition.
- Explain the method to calculate the doses of different solutes to prepare those solutions used clinically.
- Calculate the deficit and replacement of fluid & electrolytes

**INTERNAL ASSESSMENT:**
- Internal assessment will be according to JSMU policy. The details of internal assessment will be determined by the respective institutions.
- Internal assessment carries 20% weightage in the final, end-of-year examination.

**Final Examination**
MCQs and OSPE