LEARNING OBJECTIVES OF CURRICULUM OF MD-PATHOLOGY

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The purpose of PG education is to create specialists who would provide high quality health care and advance the cause of science through research & training.

This programme is meant to standardize Pathology teaching at post graduate level throughout the country so that it will benefit in achieving uniformity in teaching and resultantly creating suitable manpower with appropriate expertise. The post graduate student should be trained in handling and processing histopathology, clinical pathology, microbiology, biochemistry and transfusion medicine samples with a knowledge of general principles and methodology.

The purpose of this document is to provide teachers and learners illustrative guidelines to achieve defined outcomes through learning and assessment. This document was prepared by various subject-content specialists. The Reconciliation Board of the Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of "domains of learning" under the heading "competencies".

SUBJECT SPECIFIC LEARNING OBJECTIVES

The learning objectives in the cognitive, psychomotor and affective domains are:

A. Cognitive Domain

1	Diagnose routine and complex clinical problems on the basis of histopathology (surgical pathology) and cytopathology specimens, blood and bone marrow examination and various tests of Laboratory Medicine (clinical pathology, clinical biochemistry) as well as Blood Banking (Transfusion Medicine).	Must to know
2	Interpret and correlate clinical and laboratory data so that clinical manifestations of diseases can be explained.	Must to know

3	Advise on the appropriate specimens and tests necessary to arrive at a diagnosis in a problematic case.	Must to know
4	Correlate clinical and laboratory findings with pathology findings at autopsy, identify miscorrelations and the causes of death due to diseases (apart from purely metabolic causes).	Must to know
5	Should be able to teach Pathology to undergraduates, postgraduates, nurses and paramedical staff including laboratory personnel.	Must to know
6	Plan, execute, analyse and present research work	Must to know
7	Make and record observations systematically and maintain accurate records of tests and their results for reasonable periods of time. Identify problems in the laboratory, offer solutions thereof and maintain a high order of quality control.	Must to know
8	Capable of safe and effective disposal of laboratory waste.	Must to know
9	Able to supervise and work with subordinates and colleagues in a laboratory	Must to know
B	**Psychomotor Domain**	
	Surgical pathology **Skills**	
1	Given the clinical and operative data, the student should be able to identify, and systematically and accurately describe the chief gross anatomic alterations in the surgically removed specimens and be able to correctly diagnose at least 80% of the lesions received on an average day from the surgical service of an average teaching hospital.	Must to know
2	A student should be able to demonstrate ability to perform a systematic gross examination of the tissues including the taking of appropriate tissue sections and in special cases as in intestinal mucosal biopsies, muscle biopsies and nerve biopsies, demonstrate the orientation of tissues in paraffin blocks	Must to know

3	The student should be able to identify and systematically and accurately describe the chief histo-morphological alterations in the tissue received in the surgical pathology service. He/she should also correctly interpret and correlate with the clinical data to diagnose at least 90% of the routine surgical material received on an average day	Must to know
4	Be conversant with automatic tissue processing machine and the principles of its running.	Must to know
5	Process a tissue, make a paraffin block and cut sections of good quality on a rotary microtome.	Must to know
6	Stain paraffin sections with at least the following: i. Haematoxylin and eosin ii. Stains for collagen, elastic fibers and reticulin iii. Iron stain iv. PAS stain v. Acid fast stains vi. Any other stains needed for diagnosis.	Must to know
7	Demonstrate understanding of the principles of: Fixation of tissues Processing of tissues for section cutting Section cutting and maintenance of related equipment Differential (special) stains and their utility	Must to know
8	Cut a frozen section using cryostat, stain and interpret the slide in correlation with the clinical data provided	Must to know
9	Demonstrate the understanding of the utility of various immuno-histochemical stains especially in the diagnosis of tumour subtypes.	Must to know
	Cytopathology **Skills**	

1	Independently prepare and stain good quality smears for cytopathologic examination.	Must to know
2	Be conversant with the techniques for concentration of specimens: i.e. various filters, centrifuge and cytocentrifuge.	Must to know
3	Independently be able o perform fine needle aspiration of all lumps in patients; make good quality smears, and be able to decide on the types of staining in a given case.	Must to know
4	Given the relevant clinical data, he/she should be able to independently and correctly: i. Diagnose at least 75% of the cases received in a routine laboratory and categorize them into negative, inconclusive and positive. ii. Demonstrate ability in the technique of screening and dotting the slides for suspicious cells. iii. Indicate correctly the type of tumour, if present iv. Identify with reasonable accuracy the presence of organisms, fungi and parasite	Must to know
	Haematology **Skills**	
1	Correctly and independently perform the following special tests, in addition to doing the routine blood counts: i. Haemogram including reticulocyte and platelet counts. ii. Bone marrow staining including stain for iron. iii. Blood smear staining iv. Cytochemical characterization of leukemia with special stains like Peroxidase, Leukocyte Alkaline Phosphatase (LAP), PAS, Sudan Black, etc. v. Hemolytic anemia profile including HPLC, Hb electrophoresis etc.	Must to know

	vi. Coagulation profile including PT, APTT, FDP. (vii) BM aspiration and BM biopsy	
2	Demonstrate familiarity with the principle and interpretation of results and the utility in diagnosis of the following: i. Platelet function tests including platelet aggregation and adhesion and PF3 release ii. Thrombophilia profile: Lupus anticoagulant (LAC), Anticardiolipin Antibody (ACA), Activated Protein C Resistance (APCR), Protein C (Pr C), Protein S (Pr S) and Antithrombin III (AT III) iii. Immunophenotyping of leukaemia iv. Cytogenetics v. Molecular diagnostics.	Must to know
3	Describe accurately the morphologic findings in the peripheral and bone marrow smears, identifying and quantitating the morphologic abnormalities in disease states and arriving at a correct diagnosis in at least 90% of the cases referred to the Haematology clinic, given the relevant clinical data.	Must to know
	Laboratory Medicine **Skill**	
1	Plan a strategy of laboratory investigation of a given case, given the relevant clinical history and physical findings in a logical sequence, with a rational explanation of each step; be able to correctly interpret the laboratory data of such studies, and discuss their significance with a view to arrive at a diagnosis.	Must to know
2	Demonstrate familiarity with and successfully perform: i. Routine urinalysis including physical, chemical and microscopic, examination of the sediment. ii. Macroscopic and microscopic examination of faeces and identify the ova and cysts of common parasites.A complete examination: physical, chemical and cell content of cerebrospinal Fluid (C.S.F), pleural and peritoneal fluid. iii. Semen analysis. iv. examination of peripheral blood for commonly occurring parasites.	Must to know

3	Independently and correctly perform at least the following quantitative **e**stimations by manual techniques and/or automated techniques. i. Blood urea ii. Blood sugar iii. Serum proteins (total and fractional) iv. Serum biIirubin (total and fractional)	Must to know
4	Demonstrate familiarity with the following quantitative estimations of blood/ serum by Automated Techniques:	Must to know
5	Serum cholesterol, Uric acid, Serum Transaminases (ALT and AST/SGOT and SGPT), etc.	Must to know
6	Prepare standard solutions and reagents relevant to the above tests, including the preparation of normal solution, molar solution and buffers.	Must to know
7	Explain the principles of Instrumentation, use and application of the instruments commonly used in the labs eg. Photoelectric colorimeter, Spectrophotometer, pH meter, Centrifuge, Electrophoresis apparatus,	Must to know
8	ELISA Reader, flow cytometer, PCR, chemiluminiscence	Must to know
	Transfusion Medicine **Skills**	
1	Selection and bleeding of donors	Must to know
2	Preparation of blood components i.e. Cryoprecipitates, Platelet concentrate, Fresh Frozen Plasma, Single Donor Plasma, Red Blood Cell concentrates.	Must to know
3	ABO and Rh grouping	Must to know
4	Demonstrate familiarity with Antenatal and Neonatal work up. (i) Direct antiglobulin test (ii) Antibody screening and titre (iii) Selection of blood for exchange transfusion	Must to know
5	Demonstrate familiarity with principle and procedures involved in:	Must to know

	(i) Resolving ABO grouping problems. (ii) Identification of RBC antibody. (iii) Investigation of transfusion reaction (iv) Testing of blood for presence of: (a) HBV (Hepatitis B Virus Markers). (b) HCV (Hepatitis C Virus Markers) (c) HIV (Human Immunodeficiency Virus Testing) (d) VDRL (e) Malaria	
	Immunohistochemistry **Skills (desirable)**	
1	Be able to perform immuno-histochemical staining using paraffin section with at least one of the commonly used antibodies (Cytokeratin or LCA) using PAP method.	Must to know
	Syllabus	
	A. General Pathology:	
1	Normal cell and tissue structure and function. The changes in cellular structure and function in disease. Causes of disease and its pathogenesis. Reaction of cells, tissues, organ systems and the body as a whole to various sublethal and lethal injuries	SIS + Seminar+ Tutorial
	B. Systemic Pathology:	
1	The study of normal structure and function of various organ system and the aetiopathogenesis, gross and microscope alterations of structure of these organ systems in disease and functional correlation with clinical features.	SIS + Seminar+ Tutorial
	C. Haematology	
1	The study of Haematology includes all aspects of the diseases of the blood and bone marrow. This would involve the study of the normal, and the causes of diseases and the changes thereof.	Tutorial +Practical

2	Laboratory Medicine (Clinical Biochemistry/Clinical Pathology including Parasitology).	Tutorial +Practical
3	Transfusion Medicine (Blood Banking).	Tutorial +Practical
4	The student is expected to acquire a general acquaintance of techniques and principles and to interpret data in the following fields. a) Immunopathology b) Electron microscopy c) Histochemistry d) Immunohistochemistry e) Cytogenetics f) Molecular Biology g) Maintenance of records h) Information retrieval, use of Computer and Internet in medicine. i) Quality control, waste disposal	Tutorial +Practical
	Surgical Pathology Knowledge	
1	The student should be able to demonstrate an understanding of the histogenetic and patho-physiologic processes associated with various lesions.	SIS + Practical+Case Discussion
2	Should be able to identify problems in the laboratory and offer viable solutions.	SIS + Practical+Case Discussion
	Autopsy Pathology Knowledge	
1	Should be aware of the technique of autopsy.	Practical + Case Discussion
2	Should have sufficient understanding of various disease processes so that a meaningful clinico-pathological correlation can be made.	Practical + Case Discussion
3	Demonstrate ability to perform a complete autopsy independently with some physical assistance, correctly following the prescribed instructions.	Practical + Case Discussion
4	In places where non-medico-legal autopsies are not available each student should be made to observe at least five medico-legal autopsies	Practical + Case Discussion
5	Write correctly and systematically Provisional and Final Anatomic Diagnosis reports.	Practical + Case Discussion
	Cytopathology	

	Knowledge	
1	Should possess the background necessary for the evaluation and reporting of cytopathology specimens	Practical + Slide Discussion+ Seminar
2	Demonstrate familiarity with the following, keeping in mind the indication for the test. i. Chronic of site from which smears may be taken ii. Type of sample iii. Method of obtaining various specimen (Urine sample, gastric smear, colonic lavage etc.) iv. Be conversant with the principles and preparation of solutions of stains	
	Haematology Knowledge	
1	○ Should demonstrate the capability of utilising the principles of the practice of Haematology for the planning of tests, interpretation and diagnosis of diseases of the blood and bone marrow. ○ Should be conversant with various equipments used in the Haematology laboratory. ○ Should have knowledge of automation and quality assurance in Haematology. ○ Correctly plan a strategy of investigating at least 90% of the cases referred for special investigations in the Hematology Clinic and give ample justification for each step in consideration of the relevant clinical data provided.	Semianr + SIS Practical + Discussion
	Laboratory Medicine **Knowledge**	
1	• Possess knowledge of the normal range of values of the chemical content of body fluids, significance of the altered values and its interpretation. • Possess knowledge of the principles of following specialized organ function tests and the relative utility and limitations of each and significance of the altered values. **i.** Renal function tests **ii.** Liver function tests **iii.** Pancreatic function tests **iv.** Endocrine function tests **v.** Tests for malabsorption	SIS + Practical + Seminar

	• Know the principles, advantages and disadvantages, scope and limitation of **a**utomation in the laboratory. • Know the principles and methodology of quality control in the laboratory.	
1	**Transfusion Medicine (Blood Banking)** **Knowledge** □ Basic immunology □ ABO and Rh groups □ Clinical significance of other blood groups □ Transfusion therapy including the use of whole blood and RBC concentrates □ Blood component therapy □ Rationale of pre-transfusion testing. □ Infections transmitted in blood. □ Adverse reactions to transfusion of blood and components □ Quality control in blood bank	Practical + Seminar + Group Discussion
1	**Basic Sciences (in relation to Pathology)** **a) Immunopathology** **Knowledge** □ Demonstrate familiarity with the current concepts of structure and function of the immune system, its aberrations and mechanisms thereof. □ Demonstrate familiarity with the scope, principles, limitations and interpretations of the results of the following procedures employed in clinical and experimental studies relating to immunology. (a) ELISA techniques (b) Radioimmunoassay (c) HLA typing □ Interpret simple immunological tests used in diagnosis of diseases and in research procedures. (i) Immunoelectrophoresis (ii) Immunofluorescence techniques especially on kidney and skin biopsies	SIS + Seminar Group Discussion

	(iii) Anti-nuclear antibody (ANA) (iv) Anti-neutrophil cytoplasmic antibody (ANCA)	
1	**b) Electron Microscopy** **Knowledge** □ Demonstrate familiarity with the principles and techniques of electron microscopy and the working of an electron microscope (including Transmission and Scanning Electron microscope: TEM and SEM) □ Recognise the appearance of the normal subcellular organelles and their common abnormalities (when provided with appropriate photographs).	Seminar + Group Discussion
1	**c) Enzyme Histochemistry** **Knowledge** □ Should be familiar with the principles, use and interpretation of common enzyme histochemical procedures (Alkaline Phosphatase, Acid Phosphatase, Glucose-6-Phosphate Dehydrogenase, Chloroacetate Esterase).	Seminar + Group Discussion + Tutorial
1	**d) Immunohistochemistry** **Knowledge** □ Demonstrate familiarity with the principles and exact procedures of various immunohistochemical stains using both PAP (Peroxidase-anti- peroxidase) and AP-AAP (Alk. Phosphatase-anti-Alk. Phosphatase) ABC (Avidin-Biotin Conjugate) systems; employing monoclonal and polyclonal antibodies. □ Be aware of the limitations of immuno-histochemistry	Practical + Discussion
1	**e) Molecular Biology** **Knowledge** □ Should understand the principles of molecular biology especially related to the understanding of disease processes and its use in various diagnostic tests. □ Should be conversant with the principle and steps and interpretation of Polymerase Chain Reaction (PCR), Western Blot, Southern Blot, Northern Blot and Hybridisation) procedures.	Practical + Seminar
1	**f) Cytogenetics Knowledge**	SIS + Practical

	□ Demonstrate familiarity with methods of Karyotyping and Fluorescent in-situ Hybridisation (FISH).	
1	**g) Tissue Culture Knowledge** Demonstrate familiarity with methods of tissue culture.	SIS + Practical
1	**h) Principles of Medical Statistics** **Knowledge** □ Demonstrate familiarity with importance of statistical methods in assessing data from patient material and experimental studies.	SIS
	TEACHING AND LEARNING METHODS	
	Rotation: **Postings to laboratories/assignments**	
1	Section/Subject — Duration in months Surgical Pathology and Autopsy and Pathology Techniques — 12 Haematology and Laboratory Medicine — 10 Cytopathology — 08 Transfusion Medicine/Blood Bank — 02 Museum techniques and record management — 01 Basic Sciencesincluding Immunopathology, Electron microscopy, Molecular Biology, Research Techniques and cytogenetics etc — 02 **Total — 35**	Must to know
2	• Collection of specimens including Fine Needle Aspiration of lumps. • Grossing of specimens. • Performing autopsies. • Discussion during routine activities such as during signing out of cases. • Presentation and work-up of cases including the identification of special stains and ancillary procedures needed. • Clinico-pathological conferences.	Must to know

	• Intradepartmental and interdepartmental conferences related to case discussions. • Conferences, Seminars, Continuing Medical Education (CME) Programmes. • Journal Club. • Research Presentation and review of research work. • A postgraduate student of a postgraduate degree course in broad specialities/super specialities would be required to present one poster presentation, to read one paper at a national/state conference and to present one research paper which should be published/accepted for publication/sent for publication during the period of his postgraduate studies so as to make him eligible to appear at the postgraduate degree examination. • Participation in workshops, conferences and presentation of papers etc. • Laboratory work. • Use and maintenance of equipment. • Maintenance of records. Log books should be maintained to record the work done which shall be checked and assessed periodically by the faculty members imparting the training. • Postgraduate students shall be required to participate in the teaching and training programme of undergraduate students and interns. • Department should encourage e-learning activities.	
	ASSESSMENT	
1	**Quarterly assessment during the MD training** **1. Journal based / recent advances learning** **2. Patient based /Laboratory or Skill based learning** **3. Self directed learning and teaching** **4. Departmental and interdepartmental learning activity** **5. External and Outreach Activities / CMEs**	Must to know
2	**Post Graduate Examination** The Post Graduate examination shall be in three parts:-	Must to know

	1. **Thesis:** Every post graduate student shall carry out work on an assigned research project under the guidance of a recognised Post Graduate Teacher, the result of which shall be written up and submitted in the form of a Thesis. Work for writing the Thesis is aimed at contributing to the development of a spirit of enquiry, besides exposing the post graduate student to the techniques of research, critical, analysis, acquaintance with the latest advances in medical science and the manner of identifying and consulting available literature. Thesis shall be submitted at least six months before the Theory and Clinical / Practical examination. The thesis shall be examined by a minimum of three examiners; one internal and two external examiners, who shall not be the examiners for Theory and Clinical examination. A post graduate student shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners	
3	2. **Theory**: The examinations shall be organised on the basis of 'Grading'or 'Marking system' to evaluate and to certify post graduate student's level of knowledge, skill and competence at the end of the training. Obtaining a minimum of 50% marks in 'Theory' as well as 'Practical' separately shall be mandatory for passing examination as a whole. The examination for M.D./ MS shall be held at the end of 3rd academic year. An academic term shall mean six month's training period. There shall be four theory papers: **Paper I:** General Pathology, Pathophysiology, Immunopathology and Cytopathology **Paper II:** Systemic Pathology **Paper III:** Haematology, Transfusion Medicine (Blood Banking) and Laboratory Medicine **Paper IV:** Recent advances and applied aspects	Must to know
3	3. **Practicals/Clinical and Oral/viva voce Examination:** The practical/clinical examination should consist of the following and should	Must to know

	be spread over two days. . **I Clinical Pathology**: • Discussion of a clinical case history. • Plan relevant investigations of the above case and interpret the biochemistry findings. • Two investigations should be performed including at least one biochemistry exercise/clinical pathology exercise like CSF, pleural tap etc. analysis and complete urinalysis.	
4	**II. Haematology:** • Discuss haematology cases given the relevant history. Plan relevant investigations • Perform complete hemogram and at least two tests preferably including one coagulation exercise • Identify electrophoresis strips, osmotic fragility charts etc. Interpretation of data from autoanalysers, HPLC and flow cytometry. Examine, report and discuss around ten cases given the history and relevant blood smears and/or bone marrow aspirate smears and bone marrow biopsy interpretation.	Must to know
5	**III. Transfusion Medicine:** • Perform blood grouping • Perform the necessary exercise like cross matching. • Coomb's test, gel cards interpretation.	Must to know
6	**IV. Histopathology**: • Examine, report and discuss 12-15 cases histopathology and	Must to know

	5-8 cytopathology cases, given the relevant history and slides. • Perform a Haematoxylin and Eosin stain and any special stain on a paraffin section. Should be conversant with histopathology techniques including cryostat.	
7	**V. Autopsy:** • Given a case history and relevant organs (with or without slides), give a list of anatomical diagnosis in a autopsy case. **VI. Gross Pathology** • Describe findings of gross specimens, give diagnosis and identify the sections to be processed. The post graduate student should perform grossing in front of the examiners for evaluation.	Must to know
8	**VII. Basic Sciences:** • 10-15 spots based on basic sciences be included • Identify electron micrographs • Identify electron micrographs • Identify gels, results of PCR, immunological tests including interpretation of Immunofluroscence pictures. • Identify histochemical and immuno-histochemistry stains • Teaching exercise 10 min	Must to know
9	All practical exercises are to be evaluated jointly by all the examiners. An oral question-answer session should be conducted at the end of each exercise. (a) Viva on dissertation and research methodology (b) General Viva-Voce	Must to know
	General Pathology	
	Cellular Responses to Stress and Toxic Insults: Adaptation, Injury, and Death	

	Introduction to Pathology, Overview: Cellular Responses to Stress and Noxious Stimuli **Adaptations of Cellular Growth and Differentiation** **Hypertrophy** *Mechanisms of Hypertrophy* **Hyperplasia** *Physiologic Hyperplasia,Pathologic Hyperplasia* *Mechanisms of Hyperplasia* **Atrophy** *Mechanisms of Atrophy* **Metaplasia** *Mechanisms of Metaplasia* **Overview of Cell Injury and Cell Death** **Causes of Cell Injury, Morphologic Alterations in Cell Injury** **Reversible Injury, Necrosis** *Patterns of Tissue Necrosis* **Mechanisms of Cell Injury** **Depletion of ATP** **Mitochondrial Damage Infl ux of Calcium and Loss of Calcium Homeostasis Accumulation of Oxygen-Derived Free Radicals (Oxidative Stress), Defects in Membrane Permeability** **Damage to DNA and Proteins** **Clinico-Pathologic Correlations: Selected Examples of Cell Injury and Necrosis** **Ischemic and Hypoxic Injury** *Mechanisms of Ischemic Cell Injury* **Ischemia-Reperfusion Injury** **Chemical (Toxic) Injury** **Apoptosis** **Causes of Apoptosis** *Apoptosis in Physiologic Situations* *Apoptosis in Pathologic Conditions* **Morphologic and Biochemical Changes in Apoptosis** *Biochemical Features of Apoptosis* **Mechanisms of Apoptosis** *The Intrinsic (Mitochondrial) Pathway of Apoptosis* *The Extrinsic (Death Receptor–Initiated) Pathway of Apoptosis* *The Execution Phase of Apoptosis* *Removal of Dead Cells* **Clinico-Pathologic Correlations: Apoptosis in Health and Disease** *Examples of Apoptosis* *Disorders Associated with Dysregulated Apoptosis* **Autophagy** **Intracellular Accumulations**	SIS + Tutorial
	Lipids *Steatosis (Fatty Change)* *Cholesterol and Cholesterol Esters* **Proteins** **Hyaline Change** **Glycogen** **Pigments** *Exogenous Pigments* *Endogenous Pigments*	Practical
	Pathologic Calcifi cation **Dystrophic Calcifi cation** **Metastatic Calcifi cation**	Practical
	Cellular Aging	

	Acute and Chronic Inflammation	
	Overview of Inflammation **Historical Highlights** **Acute Inflammation** **Stimuli for Acute Inflammation** **Reactions of Blood Vessels in Acute Inflammation** *Changes in Vascular Flow and Caliber, Increased Vascular Permeability (Vascular Leakage)* *Responses of Lymphatic Vessels* **Reactions of Leukocytes in Inflammation** *Recruitment of Leukocytes to Sites of Infection and Injury* *Recognition of Microbes and Dead Tissues* *Removal of the Offending Agents Other Functional Responses of* *Activated Leukocytes Release of Leukocyte Products and Leukocyte-Mediated Tissue Injury* *Defects in Leukocyte Function* **Termination of the Acute Inflammatory Response** **Mediators of Inflammation** **Cell-Derived Mediators** *Vasoactive Amines: Histamine and Serotonin* *Arachidonic Acid (AA) Metabolites:* *Prostaglandins, Leukotrienes,and Lipoxins* *Platelet-Activating Factor (PAF)* *Reactive Oxygen Species* *Nitric Oxide, Cytokines and Chemokines* *Lysosomal Constituents of Leukocytes, Neuropeptides* **Plasma Protein–Derived Mediators** *Complement System* *Coagulation and Kinin Systems* **Outcomes of Acute Inflammation** **Morphologic Patterns of Acute Inflammation** **Serous Inflammation** **Fibrinous Inflammation** **Suppurative or Purulent Inflammation;** **Abscess** **Ulcers** **Summary of Acute Inflammation** **Chronic Inflammation** **Causes of Chronic Inflammation** **Morphologic Features** **Role of Macrophages in Chronic Inflammation** **Other Cells in Chronic Inflammation** **Granulomatous Inflammation** **Systemic Effects of Inflammation** **Consequences of Defective or Excessive Inflammation**	SIS + Tutorial
	Tissue Renewal, Regeneration, and Repair	
	Control of Normal Cell Proliferation and Tissue Growth **Tissue Proliferative Activity Stem Cells** *Embryonic Stem Cells* *Reprogramming of Differentiated Cells:* *Induced Pluripotent Stem Cells* *Adult (Somatic) Stem Cells* *Stem Cells in Tissue Homeostasis* **Cell Cycle and the Regulation of Cell Replication** **Growth Factors** **Signaling Mechanisms in Cell Growth** *Receptors and Signal Transduction Pathways* *Transcription Factors* **Mechanisms of Tissue and Organ**	SIS + Tutorial

	Regeneration **Liver Regeneration** **Extracellular Matrix and Cell-Matrix Interactions** **Collagen Elastin, Fibrillin, and Elastic Fibers** **Cell Adhesion Proteins** **Glycosaminoglycans (GAGs) and Proteoglycans** **Healing by Repair, Scar Formation,and Fibrosis** **Mechanisms of Angiogenesis** *Growth Factors and Receptors* *Involved in Angiogenesis,ECM Proteins as Regulators of Angiogenesis* **Cutaneous Wound Healing, Local and Systemic Factors That Influence, Wound Healing** **Pathologic Aspects of Repair** *Fibrosis*	
	Hemodynamic Disorders, Thromboembolic Disease, and Shock	
	Edema, Hyperemia and Congestion **Hemorrhage** **Hemostasis and Thrombosis** **Normal Hemostasis** *Endothelium, Platelets,Coagulation Cascade* **Thrombosis** **Disseminated Intravascular Coagulation (DIC)** **Embolism** **Pulmonary Embolism, Systemic Thromboembolism** **Fat and Marrow Embolism, Air Embolism, Amniotic Fluid Embolism** **Infarction, Shock** **Pathogenesis of Septic Shock, Stages of Shock**	SIS + Tutorial
	Genetic Disorders	
	Disorders, Chromosomal Disorders **Normal Human Genetic Architecture, Genes and Human Diseases** **Mutations** **Mendelian Disorders** **Transmission Patterns of Single-Gene, Disorders** *Autosomal Dominant Disorders, Autosomal Recessive Disorders, X-Linked Disorders* **Biochemical and Molecular Basis of Single-Gene (Mendelian) Disorders** *Enzyme Defects and Their, Consequences* *Defects in Receptors and Transport, Systems* *Alterations in Structure, Function, or Quantity of Nonenzyme Proteins* *Genetically Determined Adverse, Reactions to Drugs* **Disorders Associated with Defects in Structural Proteins** *Marfan Syndrome Ehlers-Danlos Syndromes (EDS)* **Disorders Associated with Defects in Receptor Proteins** *Familial Hypercholesterolemia* **Disorders Associated with Defects in Enzymes** *Lysosomal Storage Diseases Glycogen Storage Diseases(Glycogenoses)* *Alkaptonuria (Ochronosis)* **Disorders Associated with Defects in Proteins That Regulate Cell Growth** **Complex Multigenic Karyotype, Structural Abnormalities of Chromosomes** **Cytogenetic Disorders Involving, Autosomes** *Trisomy 21 (Down Syndrome)Other Trisomies* *Chromosome 22q11.2 Deletion Syndrome* **Cytogenetic Disorders Involving Sex Chromosomes** *Klinefelter Syndrome Turner Syndrome, Hermaphroditism and Pseudohermaphroditism* **Single-Gene Disorders with Nonclassic, Inheritance** **Diseases Caused by Trinucleotide-Repeat Mutations** *Fragile-X Syndrome* **Mutations in Mitochondrial Genes—Leber, Hereditary Optic Neuropathy, Genomic Imprinting**	SIS + Tutorial

	Prader-Willi Syndrome and Angelman Syndrome **Gonadal Mosaicism** **Molecular Diagnosis of Genetic Diseases*** **Indications for Analysis of Germ Line, Genetic Alterations** **Indications for Analysis of Acquired** **Genetic Alterations** **PCR and Detection of DNA Sequence Alterations**	
	Neoplasia	
	Nomenclature **Characteristics of Benign and Malignant Neoplasms** **Differentiation and Anaplasia** **Rates of Growth** **Cancer Stem Cells and Cancer Cell Lineages** **Local Invasion** **Metastasis** *Pathways of Spread* **Epidemiology** **Cancer Incidence** **Geographic and Environmental Factors Age** **Genetic Predisposition to Cancer** **Nonhereditary Predisposing Conditions** **Molecular Basis of Cancer** **Essential Alterations for Malignant Transformation** **Self-Suffi ciency in Growth Signals: Oncogenes** *Proto-oncogenes, Oncogenes, and Oncoproteins* *Alterations in Nonreceptor Tyrosine Kinases* **Insensitivity to Growth Inhibition and Escape from Senescence: Tumor Suppressor Genes** **Evasion of Apoptosis** **Limitless Replicative Potential: Telomerase** **Angiogenesis** **Invasion and Metastasis** *Invasion of Extracellular Matrix* *Vascular Dissemination and Homing of Tumor Cells* *Molecular Genetics of Metastasis* *Development* **Genomic Instability—Enabler of Malignancy** **Stromal Microenvironment and Carcinogenesis** **Metabolic Alterations: The Warburg Effect** **Dysregulation of Cancer-Associated Genes** *Chromosomal Changes* *Gene Amplifi cation* *Epigenetic Changes* *miRNAs and Cancer* **Molecular Basis of Multistep Carcinogenesis** **Carcinogenic Agents and Their Cellular Interactions** *Steps Involved in Chemical Carcinogenesis* *Direct-Acting Agents*	SIS + Tutorial+Practical

	Indirect-Acting Agents *Initiation and Promotion of Chemical Carcinogenesis* **Radiation Carcinogenesis** *Ultraviolet Rays* *Ionizing Radiation* **Microbial Carcinogenesis** *Oncogenic RNA Viruses* *Oncogenic DNA Viruses* *Helicobacter pylori* **Host Defense against Tumors—Tumor Immunity** **Tumor Antigens** **Antitumor Effector Mechanisms** **Clinical Aspects of Neoplasia** *Local and Hormonal Effects* *Cancer Cachexia* *Paraneoplastic Syndromes* **Grading and Staging of Tumors** **Laboratory Diagnosis of Cancer** *Molecular Profi les of Tumors* *Tumor Markers*	
	Infectious Diseases	
	General Principles of Microbial Pathogenesis **Categories of Infectious Agents** *Prions* *Viruses* *Bacteria* *Fungi* *Protozoa* *Helminths* *Ectoparasites* **Special Techniques for Diagnosing Infectious Agents** **New and Emerging Infectious Diseases Agents of Bioterrorism** **Transmission and Dissemination of Microbes** *Routes of Entry of Microbes* *Spread and Dissemination of Microbes* *Release of Microbes from the Body* *Sexually Transmitted Infections* *Healthcare-Associated Infections* *Host Defenses Against Infections* **How Microorganisms Cause Disease** *Mechanisms of Viral Injury* *Mechanisms of Bacterial Injury* *Injurious Effects of Host Immunity* **Immune Evasion by Microbes** **Infections in Immunosuppressed Hosts** **Spectrum of Infl ammatory Responses to Infection** *Suppurative (Purulent) Infl ammation* *Mononuclear and Granulomatous Infl ammation* *Cytopathic-Cytoproliferative Reaction* *Tissue Necrosis* *Chronic Infl ammation and Scarring* **Viral Infections**	SIS + Tutorial +Practical

	Acute (Transient) Infections *Measles* *Mumps* *Poliovirus Infection* *West Nile Virus* *Viral Hemorrhagic Fevers* **Chronic Latent Infections (Herpesvirus Infections)** *Herpes Simplex Virus (HSV)* *Varicella-Zoster Virus (VZV)* *Cytomegalovirus (CMV)* **Chronic Productive Infections** *Hepatitis B Virus* **Transforming Infections** *Epstein-Barr Virus (EBV)* **Bacterial Infections** **Gram-Positive Bacterial Infections** *Staphylococcal Infections* *Streptococcal and Enterococcal Infections* *Diphtheria* *Listeriosis* *Anthrax* *Nocardia* **Gram-Negative Bacterial Infections** *Neisserial Infections* *Whooping Cough* *Pseudomonas Infection* *Plague* *Chancroid (Soft Chancre)* *Granuloma Inguinale* **Mycobacteria** *Tuberculosis* *Mycobacterium aviumintracellulare Complex* *Leprosy* **Spirochetes** *Syphilis, Relapsing Fever,Lyme Disease,* **Anaerobic Bacteria** *Abscesses Caused by Anaerobes, Clostridial Infections* **Obligate Intracellular Bacteria** *Chlamydial Infection, Rickettsial Infections* **Fungal Infections** *Candidiasis, Cryptococcosis, Aspergillosis, Zygomycosis (Mucormycosis)* **Parasitic Infections** **Protozoa** *Malaria, Babesiosis, Leishmaniasis, African Trypanosomiasis, Chagas Disease* **Metazoa** *Strongyloidiasis, Tapeworms (Cestodes): Cysticercosis and Hydatid Disease,Trichinosis Schistosomiasis Lymphatic Filariasis, Onchocerciasis*	
	Environmental and Nutritional Diseases **The Global Burden of Disease Health Effects of Climate Change** **Toxicity of Chemical and Physical Agents Environmental Pollution** **Air Pollution** *Outdoor Air Pollution, Indoor Air Pollution* **Metals as Environmental Pollutants** *Lead, Mercury, Arsenic Cadmium* **Occupational Health Risks:** **Industrial and Agricultural, Exposures, Effects of Tobacco** **Effects of Alcohol, Injury by Therapeutic Drugs and Drugs of Abuse**	SIS + Tutorial

	Injury by Therapeutic Drugs (Adverse Drug Reactions) *Hormonal Replacement Therapy (HRT)* *Oral Contraceptives (OCs) Anabolic Steroids* *Acetaminophen Aspirin (Acetylsalicylic Acid)* **Injury by Nontherapeutic Agents (Drug Abuse)** *Cocaine, Heroin, Amphetamines Marijuana, Other Drugs* **Injury by Physical Agents** **Mechanical Trauma** **Thermal Injury** *Thermal Burns, Hyperthermia* *Hypothermia,* **Electrical Injury** **Injury Produced by Ionizing Radiation** **Nutritional Diseases** **Dietary Insuffi ciency, Protein-Energy Malnutrition (PEM)** **Anorexia Nervosa and Bulimia, Vitamin Deficiencies** *Vitamin A, Vitamin D, Vitamin C (Ascorbic Acid)* **Obesity** *General Consequences of Obesity,Obesity and Cancer* **Diets, Cancer, and Atherosclerosis** *Diet and Cancer, Diet and Atherosclerosis*	
	Diseases of Infancy and Childhood	
	Congenital Anomalies **Defi nitions** **Causes of Anomalies** *Genetic Causes, Environmental Causes, Multifactorial Causes* **Pathogenesis of Congenital Anomalies** **Disorders of Prematurity** **Causes of Prematurity and Fetal Growth Restriction** **Neonatal Respiratory Distress Syndrome, Necrotizing Enterocolitis** **Perinatal Infections** **Transcervical (Ascending) Infections, Transplacental (Hematologic) Infections Sepsis** **Fetal Hydrops** **Immune Hydrops Nonimmune Hydrops** **Inborn Errors of Metabolism and Other Genetic Disorders** **Phenylketonuria (PKU)** **Galactosemia** **Cystic Fibrosis (Mucoviscidosis)** **Sudden Infant Death Syndrome (SIDS)** **Tumors and Tumor-like Lesions of Infancy and Childhood** **Benign Tumors and Tumor-like Lesions** **Malignant Tumors** *Incidence and Types The Neuroblastic Tumors, Wilms Tumor*	SIS + Tutorial
	Immunopathology	
	Diseases of the Immune System	
	The Normal Immune Response **Innate Immunity Adaptive Immunity** **Components of the Immune System:** **Cells, Tissues, and Selected Molecules** *Cells of the Immune System* *Tissues of the Immune System* *MHC Molecules: Peptide Display* *System of Adaptive Immunity* *Cytokines: Messenger Molecules of the Immune System* **Overview of Lymphocyte Activation and Immune Responses** *The Display and Recognition of*	SIS + Tutorial

Antigens
Cell-Mediated Immunity: Activation of T Lymphocytes and Elimination of Intracellular Microbes
Humoral Immunity: Activation of B Lymphocytes and Elimination of Extracellular Microbes
Decline of Immune Responses and Immunological Memory
Hypersensitivity and Autoimmune Disorders
Mechanisms of Hypersensitivity Reactions
Immediate (Type I) Hypersensitivity
Antibody-Mediated (Type II) Hypersensitivity
Immune Complex–Mediated (Type III) Hypersensitivity
T Cell–Mediated (Type IV) Hypersensitivity
Autoimmune Diseases
Immunological Tolerance
Mechanisms of Autoimmunity: General Principles
General Features of Autoimmune Diseases
Systemic Lupus Erythematosus (SLE)
Spectrum of Autoantibodies in SLE
Etiology and Pathogenesis of SLE
Drug-Induced Lupus Erythematosus
Rheumatoid Arthritis
Sjögren Syndrome
Etiology and Pathogenesis
Systemic Sclerosis (Scleroderma)
Etiology and Pathogenesis
Infl ammatory Myopathies
Mixed Connective Tissue Disease
Polyarteritis Nodosa and Other Vasculitides
Rejection of Tissue Transplants
Mechanisms of Recognition and Rejection of Allografts
Rejection of Kidney Grafts
Transplantation of Other Solid Organs
Transplantation of Hematopoietic Cells
Immunodefi ciency Syndromes
Primary Immunodefi ciencies
X-Linked Agammaglobulinemia (Bruton's Agammaglobulinemia)
Common Variable Immunodefi cieny
Isolated IgA Defi ciency
Hyper-IgM Syndrome
DiGeorge Syndrome (Thymic Hypoplasia)
Severe Combined Immunodefi ciency
Immunodefi ciency with Thrombocytopenia and Eczema (Wiskott-Aldrich Syndrome)
Genetic Defi ciencies of the Complement System
Secondary Immunodefi ciencies
Diseases of the Immune System
Acquired Immunodefi ciency Syndrome (AIDS)

	Epidemiology *Etiology: The Properties of HIV* *Pathogenesis of HIV Infection and AIDS* *Natural History of HIV Infection* *Clinical Features of AIDS* **Amyloidosis** *Properties of Amyloid Proteins* *Pathogenesis of Amyloidosis* *Classifi cation of Amyloidosis*	
	Systemic Pathology	
	Blood Vessels	
	The Structure and Function of Blood Vessels, Vessel Development, Growth, and Remodeling **Congenital Anomalies, Vascular Wall Cells and Their Response to Injury** **Hypertensive Vascular Disease** **Vascular Pathology in Hypertension** **Arteriosclerosis** **Atherosclerosis** **Epidemiology** **Pathogenesis of Atherosclerosis** *Endothelial Injury, Smooth Muscle Proliferation, Overview* **Consequences of Atherosclerotic Disease** **Aneurysms and Dissection** **Abdominal Aortic Aneurysm (AAA)** **Thoracic Aortic Aneurysms** **Aortic Dissection** **Vasculitis** **Noninfectious Vasculitis** **Giant-Cell (Temporal) Arteritis** **Takayasu Arteritis** **Polyarteritis Nodosa** **Kawasaki Disease** **Microscopic Polyangiitis** **Churg-Strauss Syndrome** **Wegener Granulomatosis** **Thromboangiitis Obliterans (Buerger Disease)** **Vasculitis Associated with Other Disorders** **Infectious Vasculitis** **Raynaud Phenomenon** **Veins and Lymphatics** **Varicose Veins** **Thrombophlebitis and Phlebothrombosis** **Superior and Inferior Vena Caval Syndromes** **Lymphangitis and Lymphedema** **Tumors** **Benign Tumors and Tumor-Like Conditions** *Hemangioma* *Lymphangiomas* *Glomus Tumor (Glomangioma)* *Vascular Ectasias* *Bacillary Angiomatosis* **Intermediate-Grade (Borderline) Tumors** *Kaposi Sarcoma* *Hemangioendothelioma* **Malignant Tumors** *Angiosarcoma*	SIS + Tutorial + Practical

	Hemangiopericytoma **Pathology of Vascular Interventions** **Angioplasty and Endovascular Stents** **Vascular Replacement**	
	The Heart	
	Cardiac Structure and Specializations **Myocardium** **Valves** **Conduction System** **Blood Supply** **Effects of Aging on the Heart** **Heart Disease: Overview of Pathophysiology** **Heart Failure** **Cardiac Hypertrophy: Pathophysiology and Progression to Failure** **Left-Sided Heart Failure** **Right-Sided Heart Failure** **Congenital Heart Disease** **Left-to-Right Shunts** *Atrial Septal Defect* *Patent Foramen Ovale* *Ventricular Septal Defect* *Patent Ductus Arteriosus* *Atrioventricular Septal Defect* **Right-to-Left Shunts** *Tetralogy of Fallot* *Transposition of the Great Arteries* *Persistent Truncus Arteriosus* *Tricuspid Atresia* *Total Anomalous Pulmonary Venous Connection* **Obstructive Congenital Anomalies** *Coarctation of the Aorta* *Pulmonary Stenosis and Atresia* *Aortic Stenosis and Atresia* **Ischemic Heart Disease** **Angina Pectoris** **Myocardial Infarction** **Chronic Ischemic Heart Disease** **Sudden Cardiac Death** **Hypertensive Heart Disease** **Systemic (Left-Sided) Hypertensive Heart Disease** **Pulmonary (Right-Sided) Hypertensive Heart Disease (Cor Pulmonale)** **Valvular Heart Disease** **Calcifi c Valvular Degeneration** *Calcifi c Aortic Stenosis* *Calcifi c Stenosis of Congenitally Bicuspid Aortic Valve* *Mitral Annular Calcifi cation* **Mitral Valve Prolapse (Myxomatous Degeneration of the Mitral Valve)** **Rheumatic Fever and Rheumatic Heart Disease** **Infective Endocarditis**	SIS + Tutorial+Practical

	Noninfected Vegetations *Nonbacterial Thrombotic Endocarditis* *Endocarditis of Systemic Lupus Erythematosus (Libman-Sacks Disease)* **Carcinoid Heart Disease** **Complications of Artifi cial Valves** **Cardiomyopathies** **Dilated Cardiomyopathy** *Arrhythmogenic Right Ventricular Cardiomyopathy* **Hypertrophic Cardiomyopathy** **Restrictive Cardiomyopathy** **Myocarditis** **Other Causes of Myocardial Disease** **Pericardial Disease** **Pericardial Effusion and Hemopericardium** **Pericarditis** *Acute Pericarditis* *Chronic or Healed Pericarditis* **Heart Disease Associated with Rheumatologic Disorders** **Tumors of the Heart** **Primary Cardiac Tumors** *Myxoma* *Lipoma* *Papillary Fibroelastoma* *Rhabdomyoma Sarcoma* **Cardiac Effects of Noncardiac Neoplasms** **Cardiac Transplantation**	
	The Lung	
	Congenital Anomalies **Atelectasis (Collapse)** **Pulmonary Edema** *Hemodynamic Pulmonary Edema* *Edema Caused by Microvascular Injury* **Acute Lung Injury and Acute Respiratory Distress Syndrome (Diffuse Alveolar Damage)** **Acute Interstitial Pneumonia** **Obstructive versus Restrictive Pulmonary Diseases** **Obstructive Pulmonary Diseases** **Emphysema Chronic Bronchitis Asthma Bronchiectasis** **Chronic Diffuse Interstitial (Restrictive) Diseases** **Fibrosing Diseases** *Idiopathic Pulmonary Fibrosis* *Nonspecifi c Interstitial Pneumonia* *Cryptogenic Organizing Pneumonia* *Pulmonary Involvement in Connective Tissue Diseases* *Pneumoconioses* *Complications of Therapies* **Granulomatous Diseases** *Sarcoidosis* *Hypersensitivity Pneumonitis* **Pulmonary Eosinophilia** **Smoking-Related Interstitial Diseases** *Desquamative Interstitial Pneumonia* *Respiratory Bronchiolitis–Associated Interstitial Lung Disease*	SIS + Tutorial + Practical

	Pulmonary Alveolar Proteinosis **Diseases of Vascular Origin** **Pulmonary Embolism, Hemorrhage, and Infarction** **Pulmonary Hypertension** **Diffuse Pulmonary Hemorrhage Syndromes** *Goodpasture Syndrome* *Idiopathic Pulmonary Hemosiderosis* *Wegener Granulomatosis* **Pulmonary Infections** **Community-Acquired Acute Pneumonias** *Streptococcus pneumoniae* *Haemophilus infl uenzae* *Moraxella catarrhalis* *Staphylococcus aureus* *Klebsiella pneumoniae* *Pseudomonas aeruginosa* *Legionella pneumophila* **Community-Acquired Atypical (Viral and Mycoplasmal) Pneumonias** *Infl uenza Infections* *Human Metapneumovirus* *Severe Acute Respiratory Syndrome* **Hospital-Acquired Pneumonia** **Aspiration Pneumonia** **Lung Abscess** **Chronic Pneumonia** *Histoplasmosis* *Blastomycosis* *Coccidioidomycosis* **Pneumonia in the Immunocompromised Host** **Pulmonary Disease in Human Immunodefi ciency Virus Infection** **Lung Transplantation Tumors** **Carcinomas** **Neuroendocrine Proliferations and Tumors** **Miscellaneous Tumors** **Metastatic Tumors** **Pleura** **Pleural Effusion** *Infl ammatory Pleural Effusions* *Noninfl ammatory Pleural Effusions* **Pneumothorax** **Pleural Tumors** *Solitary Fibrous Tumor* *Malignant Mesothelioma*	
	Head and Neck	
	ORAL CAVITY **Teeth and Supporting Structures** **Caries (Tooth Decay)** **Gingivitis** **Periodontitis** **Infl ammatory/Reactive Tumor-like Lesions** **Fibrous Proliferative Lesions** **Aphthous Ulcers (Canker Sores)** **Glossitis** **Infections** **Herpes Simplex Virus Infections** **Other Viral Infections** **Oral Candidiasis (Thrush)** **Deep Fungal Infections**	SIS + Tutorial + Practical

	Oral Manifestations of Systemic Disease **Hairy Leukoplakia** **Tumors and Precancerous Lesions** **Leukoplakia and Erythroplakia** **Squamous Cell Carcinoma** **Odontogenic Cysts and Tumors** UPPER AIRWAYS **Nose** **Infl ammations** **Necrotizing Lesions of the Nose and Upper Airways** **Nasopharynx** **Infl ammations** **Tumors of the Nose, Sinuses, and Nasopharynx** **Larynx** **Infl ammations** **Reactive Nodules (Vocal Cord Nodules and Polyps)** **Squamous Papilloma and Papillomatosis** **Carcinoma of the Larynx** EARS **Infl ammatory Lesions** **Otosclerosis** **Tumors** NECK **Branchial Cyst (Cervical Lymphoepithelial Cyst)** **Thyroglossal Duct Cyst** **Paraganglioma (Carotid Body Tumor)** SALIVARY GLANDS **Xerostomia** **Infl ammation (Sialadenitis)** **Neoplasms** **Pleomorphic Adenoma** **Warthin Tumor (Papillary Cystadenoma Lymphomatosum)** **Mucoepidermoid Carcinoma** **Other Salivary Gland Tumor**	
	The Gastrointestinal Tract	
	CONGENITAL ABNORMALITIES **Atresia, Fistulae, and Duplications** **Diaphragmatic Hernia, Omphalocele, and Gastroschisis** **Ectopia** **Meckel Diverticulum** **Pyloric Stenosis** **Hirschsprung Disease** ESOPHAGUS **Esophageal Obstruction** **Achalasia** **Esophagitis** **Lacerations** **Chemical and Infectious Esophagitis** **Refl ux Esophagitis** **Eosinophilic Esophagitis**	SIS + Tutorial + Practical

Barrett Esophagus
Esophageal Varices
Esophageal Tumors
Adenocarcinoma
Squamous Cell Carcinoma
Uncommon Esophageal Tumors

STOMACH

Acute Gastritis
Acute Gastric Ulceration
Chronic Gastritis
***Helicobacter Pylori* Gastritis**
Autoimmune Gastritis
Uncommon Forms of Gastritis
Complications of Chronic Gastritis
Peptic Ulcer Disease
Mucosal Atrophy and Intestinal Metaplasia
Dysplasia
Gastritis Cystica
Hypertrophic Gastropathies
Ménétrier Disease
Zollinger-Ellison Syndrome
Gastric Polyps and Tumors
Infl ammatory and Hyperplastic Polyps
Fundic Gland Polyps
Gastric Adenoma
Gastric Adenocarcinoma
Lymphoma
Carcinoid Tumor
Gastrointestinal Stromal Tumor

SMALL INTESTINE AND COLON

Intestinal Obstruction
Hernias
Adhesions
Volvulus
Intussusception
Ischemic Bowel Disease
Angiodysplasia
Malabsorption and Diarrhea
Cystic Fibrosis
Celiac Disease
Tropical Sprue
Autoimmune Enteropathy
Lactase (Disaccharidase) Defi ciency
Abetalipoproteinemia
Infectious Enterocolitis
Cholera
***Campylobacter* Enterocolitis**
Shigellosis
Salmonellosis
Typhoid Fever
Yersinia
Escherichia Coli
Pseudomembranous Colitis
Whipple Disease
Viral Gastroenteritis
Parasitic Enterocolitis
Irritable Bowel Syndrome
Infl ammatory Bowel Disease
Crohn Disease

	Ulcerative Colitis *Indeterminate Colitis* *Colitis-Associated Neoplasia* **Other Causes of Colitis** **Diversion Colitis** **Microscopic Colitis** **Graft-versus-Host Disease** **Sigmoid Diverticulitis** **Polyps** **Infl ammatory Polyps** **Hamartomatous Polyps** *Juvenile Polyps* *Peutz-Jeghers Syndrome* *Cowden Syndrome and Bannayan-Ruvalcaba-Riley Syndrome* *Cronkhite-Canada Syndrome* **Hyperplastic Polyps** **Neoplastic Polyps** **Familial Syndromes** **Familial Adenomatous Polyposis** **Hereditary Non-Polyposis Colorectal Cancer** **Adenocarcinoma** **Tumors of the Anal Canal** **Hemorrhoids** **Acute Appendicitis** **Tumors of the Appendix** PERITONEAL CAVITY **Infl ammatory Disease** **Peritoneal Infection** **Sclerosing Retroperitonitis** **Cysts** **Tumors**	
	Liver and Biliary Tract	
	THE LIVER **General Features of Hepatic Disease** **Patterns of Hepatic Injury** **Hepatic Failure** **Cirrhosis** **Portal Hypertension** **Jaundice and Cholestasis** *Bilirubin and Bile Formation* *Pathophysiology of Jaundice Cholestasis* **Infectious Disorders** **Viral Hepatitis** *Hepatitis A Virus* *Hepatitis B Virus* *Hepatitis C Virus* *Hepatitis D Virus* *Hepatitis E Virus* *Hepatitis G Virus* *Clinicopathologic Syndromes of Viral Hepatitis* **Bacterial, Parasitic, and Helminthic Infections** **Autoimmune Hepatitis** **Drug- and Toxin-Induced Liver Disease** **Alcoholic Liver Disease** **Metabolic Liver Disease** **Nonalcoholic Fatty Liver Disease** **Hemochromatosis** **Wilson Disease** **Antitrypsin Deficiency**	SIS + Tutorial + Practical

	Neonatal Cholestasis **Intrahepatic Biliary Tract Disease** **Secondary Biliary Cirrhosis** **Primary Biliary Cirrhosis (PBC)** **Primary Sclerosing Cholangitis (PSC)** **Anomalies of the Biliary Trees** **(Including Liver Cysts)** **Circulatory Disorders** **Impaired Blood Flow into the Liver** *Hepatic Artery Compromise* *Portal Vein Obstruction and Thrombosis* **Impaired Blood Flow through the Liver** *Passive Congestion and Centrilobular Necrosis* *Peliosis Hepatis* **Hepatic Venous Outfl ow Obstruction** *Hepatic Vein Thrombosis and Inferior Vena Cava Thrombosis* *Sinusoidal Obstruction Syndrome (Veno-Occlusive Disease)* **Hepatic Complications of Organ or Bone Marrow Transplantation** **Graft-Versus-Host Disease and Liver Rejection** **Hepatic Disease Associated with Pregnancy** **Preeclampsia and Eclampsia** **Acute Fatty Liver of Pregnancy** **Intrahepatic Cholestasis of Pregnancy** **Nodules and Tumors** **Nodular Hyperplasias** **Benign Neoplasms** *Hepatic Adenoma* **Malignant Tumors** *Hepatoblastoma* *Hepatocellular Carcinoma (HCC)* *Cholangiocarcinoma (CCA)* **Metastatic Tumors** THE BILIARY TRACT **Congenital Anomalies** **Disorders of the Gallbladder** **Cholelithiasis (Gallstones)** **Cholecystitis** *Acute Cholecystitis* *Chronic Cholecystitis* **Disorders of the Extrahepatic Bile Ducts** **Choledocholithiasis and Ascending Cholangitis** **Biliary Atresia** **Choledochal Cysts** **Tumors** **Carcinoma of the Gallbladder**	
	The Pancreas	
	Congenital Anomalies **Agenesis** **Pancreas Divisum** **Annular Pancreas** **Ectopic Pancreas** **Pancreatitis** **Acute Pancreatitis** **Chronic Pancreatitis** **Non-Neoplastic Cysts** **Congenital Cysts**	SIS + Tutorial

	Pseudocysts **Neoplasms** **Cystic Neoplasms** **Pancreatic Carcinoma** *Precursors to Pancreatic Cancer* *Molecular Carcinogenesis* **Acinar Cell Carcinoma** **Pancreatoblastoma**	
	The Kidney	
	Clinical Manifestations of Renal Diseases **Glomerular Diseases** **Clinical Manifestations** **Histologic Alterations** **Pathogenesis of Glomerular Injury** *Immune Complex Deposition Involving Intrinsic and in Situ Renal Antigens* *Circulating Immune Complex Glomerulonephritis* *Antibodies to Glomerular Cells* *Cell-Mediated Immunity in Glomerulonephritis* *Other Mechanisms of Glomerular Injury* *Activation of Alternative Complement Pathway* *Epithelial Cell Injury* *Mediators of Glomerular Injury* **Mechanisms of Progression in Glomerular Diseases** **Nephritic Syndrome** *Acute Proliferative (Poststreptococcal, Postinfectious) Glomerulonephritis* **Rapidly Progressive (Crescentic) Glomerulonephritis** **Nephrotic Syndrome** *Membranous Nephropathy* *Minimal-Change Disease* *Focal Segmental Glomerulosclerosis* *Membranoproliferative Glomerulonephritis* **Isolated Urinary Abnormalities** *IgA Nephropathy (Berger Disease)* *Alport Syndrome* *Thin Basement Membrane Disease (Benign Familial Hematuria)* **Chronic Glomerulonephritis** **Glomerular Lesions Associated with Systemic Diseases** *Lupus Nephritis* *Henoch-Schönlein Purpura* *Bacterial Endocarditis–Associated Glomerulonephritis* *Diabetic Nephropathy* *Amyloidosis* *Fibrillary Glomerulonephritis and Immunotactoid Glomerulopathy* *Other Systemic Disorders* **Tubular and Interstitial Diseases** **Acute Kidney Injury (Acute Tubular Necrosis)** **Tubulointerstitial Nephritis** *Pyelonephritis and Urinary Tract*	SIS + Tutorial + Practical

	Infection *Acute Pyelonephritis* *Chronic Pyelonephritis and Refl ux* *Nephropathy* *Tubulointerstitial Nephritis Induced by* *Drugs and Toxins* *Other Tubulointerstitial Diseases* **Vascular Diseases** **Benign Nephrosclerosis** **Malignant Hypertension and Accelerated** **Nephrosclerosis** **Renal Artery Stenosis** **Thrombotic Microangiopathies** *Epidemic Hemolytic-Uremic* *Syndrome* *Non-Epidemic Hemolytic-Uremic* *Syndrome* *Thrombotic Thrombocytopenic* *Purpura* **Other Vascular Disorders** *Atherosclerotic Ischemic Renal Disease* *Atheroembolic Renal Disease* *Sickle-Cell Disease Nephropathy* *Diffuse Cortical Necrosis* *Renal Infarcts* **Congenital Anomalies** **Multicystic Renal Dysplasia** **Cystic Diseases of the Kidney** **Autosomal-Dominant (Adult) Polycystic** **Kidney Disease** **Autosomal-Recessive (Childhood)** **Polycystic Kidney Disease** **Cystic Diseases of Renal Medulla** *Medullary Sponge Kidney* *Nephronophthisis and Adult-Onset* *Medullary Cystic Disease* **Acquired (Dialysis-Associated) Cystic Disease Simple Cysts** **Urinary Tract Obstruction (Obstructive Uropathy)** **Urolithiasis (Renal Calculi, Stones)** **Tumors of the Kidney** **Benign Tumors** *Renal Papillary Adenoma* *Angiomyolipoma* *Oncocytoma* **Malignant Tumors** *Renal Cell Carcinoma (Adenocarcinoma of the Kidney)* *Urothelial Carcinomas of the Renal* *Pelvis*	
	The Lower Urinary Tract and Male Genital System	
	THE LOWER URINARY TRACT **Ureters** **Congenital Anomalies** **Inflammation** **Tumors and Tumor-like Lesions** **Obstructive Lesions** **Urinary Bladder** **Congenital Anomalies** **Inflammation** *Acute and Chronic Cystitis* *Special Forms of Cystitis*	SIS + Tutorial + Practical

	Metaplastic Lesions **Neoplasms** *Urothelial Tumors* *Mesenchymal Tumors* *Secondary Tumors* **Obstruction** **Urethra** **Infl ammation** **Tumors and Tumor-like Lesions** THE MALE GENITAL TRACT **Penis** **Congenital Anomalies** *Hypospadias and Epispadias* *Phimosis* **Infl ammation** **Tumors** *Benign Tumors* *Malignant Tumors* **Testis and Epididymis** **Congenital Anomalies** *Cryptorchidism* **Regressive Changes** *Atrophy and Decreased Fertility* **Inflammation** *Nonspecific Epididymitis and Orchitis* *Granulomatous (Autoimmune) Orchitis* *Specifi c Inflammations* **Vascular Disorders** *Torsion* **Spermatic Cord and Paratesticular Tumors** **Testicular Tumors** *Germ Cell Tumors* *Tumors of Sex Cord–Gonadal Stroma* *Gonadoblastoma* *Testicular Lymphoma* **Miscellaneous Lesions of Tunica Vaginalis** **Prostate** **Infl ammation** **Benign Enlargement** *Benign Prostatic Hyperplasia (BPH) or Nodular Hyperplasia* **Tumors** *Adenocarcinoma* *Miscellaneous Tumors and Tumor-like Conditions*	
	The Female Genital Tract	
	Development **Anatomy** **Infections of the Female Genital Tract** *Infections of the Lower Genital Tract* *Infections Involving the Lower and Upper Genital Tract* VULVA **Bartholin Cyst** **Non-Neoplastic Epithelial Disorders** **Lichen Sclerosus**	SIS + Tutorial + Practical

	Squamous Cell Hyperplasia **Benign Exophytic Lesions** **Condyloma Acuminatum** **Squamous Neoplastic Lesions** **Vulvar Intraepithelial Neoplasia and Vulvar Carcinoma** **Glandular Neoplastic Lesions** **Papillary Hidradenoma** **Extramammary Paget Disease** **Malignant Melanoma** VAGINA **Development Anomalies** **Premalignant and Malignant Neoplasms** **Vaginal Intraepithelial Neoplasia and Squamous Cell Carcinoma** **Embryonal Rhabdomyosarcoma** CERVIX **Inflammations** **Acute and Chronic Cervicitis** **Endocervical Polyps** **Premalignant and Malignant Neoplasms** **Cervical Intraepithelial Neoplasia** **Cervical Carcinoma** *Cervical Cancer Screening And Prevention* BODY OF UTERUS AND ENDOMETRIUM **Endometrial Histology in the Menstrual Cycle** **Functional Endometrial Disorders (Dysfunctional Uterine Bleeding)** **Anovulatory Cycle** **Inadequate Luteal Phase** **Endometrial Changes Induced by Oral Contraceptives** **Menopausal and Postmenopausal Changes** **Infl ammation** **Acute Endometritis** **Chronic Endometritis** **Endometriosis and Adenomyosis** **Endometrial Polyps** **Endometrial Hyperplasia** **Malignant Tumors of the Endometrium** **Carcinoma of the Endometrium** **Malignant Mixed Müllerian Tumors** **Tumors of the Endometrium with Stromal Differentiation** **Adenosarcomas** **Stromal Tumors** **Tumors of the Myometrium** **Leiomyomas** **Leiomyosarcomas** FALLOPIAN TUBES **Infl ammations** **Tumors and Cysts** OVARIES	

	Non-Neoplastic and Functional Cysts **Follicle and Luteal Cysts** **Polycystic Ovaries and Stromal Hyperthecosis** **Ovarian Tumors** **Tumors of Surface (Müllerian) Epithelium** *Serous Tumors* *Mucinous Tumors* *Endometrioid Tumors* *Clear Cell Adenocarcinoma* *Cystadenofi broma* *Brenner Tumor* *Clinical Course, Detection, and Prevention of Surface Epithelial Tumors* **Germ Cell Tumors** *Teratomas* *Dysgerminoma* *Endodermal Sinus (Yolk Sac) Tumor* *Choriocarcinoma* *Other Germ Cell Tumors* **Sex Cord–Stromal Tumors** *Granulosa–Theca Cell Tumors* *Fibromas, Thecomas, and Fibrothecomas* *Sertoli–Leydig Cell Tumors (Androblastomas)* *Other Sex Cord–Stromal Tumors* *Metastatic Tumors* GESTATIONAL AND PLACENTAL DISORDERS **Disorders of Early Pregnancy** **Spontaneous Abortion** **Ectopic Pregnancy** **Disorders of Late Pregnancy** **Twin Placentas** **Abnormalities of Placental Implantation** **Placental Infections** **Preeclampsia and Eclampsia** **Gestational Trophoblastic Disease** **Hydatidiform Mole** *Complete Mole* *Partial Mole* **Invasive Mole** **Choriocarcinoma** **Placental Site Trophoblastic Tumor (PSTT)**	
	The Breast	
	THE FEMALE BREAST **Disorders of Development** **Clinical Presentations of Breast Disease** **Infl ammatory Disorders** **Acute Mastitis** **Periductal Mastitis** **Mammary Duct Ectasia** **Fat Necrosis** **Lymphocytic Mastopathy (Sclerosing Lymphocytic Lobulitis)** **Granulomatous Mastitis** **Benign Epithelial Lesions** **Nonproliferative Breast Changes (Fibrocystic Changes)**	SIS + Tutorial + Practical

	Proliferative Breast Disease without Atypia **Proliferative Breast Disease with Atypia** **Clinical Signifi cance of Benign Epithelial Changes** **Carcinoma of the Breast** **Incidence and Epidemiology** **Etiology and Pathogenesis** *Hereditary Breast Cancer* *Sporadic Breast Cancer* *Overview of Carcinogenesis and Tumor Progression* **Classifi cation of Breast Carcinoma** *Carcinoma in Situ* *Invasive (Infi ltrating) Carcinoma* *Invasive Carcinoma, No Special Type (NST; Invasive Ductal Carcinoma)* *Invasive Lobular Carcinoma* *Medullary Carcinoma* *Mucinous (Colloid) Carcinoma* *Tubular Carcinoma* *Invasive Papillary Carcinoma* *Metaplastic Carcinoma* **Prognostic and Predictive Factors** **Stromal Tumors** *Fibroadenoma* *Phyllodes Tumor* *Benign Stromal Lesions* *Malignant Stromal Tumors* **Other Malignant Tumors of the Breast** THE MALE BREAST **Gynecomastia** **Carcinoma**	
	The Endocrine System	
	PITUITARY GLAND **Clinical Manifestations of Pituitary Disease** **Pituitary Adenomas and Hyperpituitarism** **Prolactinomas** **Growth Hormone Cell (Somatotroph) Adenomas** **ACTH Cell (Corticotroph) Adenomas** **Other Anterior Pituitary Adenomas** **Hypopituitarism** **Posterior Pituitary Syndromes** **Hypothalamic Suprasellar Tumors** THYROID GLAND **Hyperthyroidism** **Hypothyroidism** **Cretinism** **Myxedema** **Thyroiditis** **Hashimoto Thyroiditis** **Subacute (Granulomatous) Thyroiditis** **Subacute Lymphocytic (Painless) Thyroiditis** **Graves Disease** **Diffuse and Multinodular Goiters** **Diffuse Nontoxic (Simple) Goiter**	SIS + Tutorial + Practical

Multinodular Goiter
Neoplasms of the Thyroid
Adenomas
Carcinomas
Pathogenesis
Papillary Carcinoma
Follicular Carcinoma
Anaplastic (Undifferentiated) Carcinoma
Medullary Carcinoma
Congenital Anomalies

PARATHYROID GLANDS

Hyperparathyroidism
Primary Hyperparathyroidism
Secondary Hyperparathyroidism
Hypoparathyroidism
Pseudohypoparathyroidism

THE ENDOCRINE PANCREAS

Diabetes Mellitus
Diagnosis
Classifi cation
Glucose Homeostasis
Regulation of Insulin Release
Insulin Action and Insulin Signaling Pathways
Pathogenesis of Type 1 Diabetes Mellitus
Genetic Susceptibility
Environmental Factors
Mechanisms of b*-Cell Destruction*
Pathogenesis of Type 2 Diabetes Mellitus
Insulin Resistance
b*-Cell Dysfunction*
Monogenic Forms of Diabetes
Pathogenesis of the Complications of Diabetes
Morphology of Diabetes and Its Late Complications
Clinical Features of Diabetes
Pancreatic Endocrine Neoplasms
Hyperinsulinism (Insulinoma)
Zollinger-Ellison Syndrome (Gastrinomas)
Other Rare Pancreatic Endocrine Neoplasms

ADRENAL GLANDS

Adrenal Cortex
Adrenocortical Hyperfunction (Hyperadrenalism)
Hypercortisolism (Cushing Syndrome)
Primary Hyperaldosteronism
Adrenogenital Syndromes
Adrenocortical Insuffi ciency
Primary Acute Adrenocortical Insuffi ciency
Waterhouse-Friderichsen Syndrome
Primary Chronic Adrenocortical Insuffi ciency (Addison Disease)
Secondary Adrenocortical Insuffi ciency
Adrenocortical Neoplasms
Other Lesions of the Adrenal
Adrenal Medulla
Pheochromocytoma

MULTIPLE ENDOCRINE NEOPLASIA

	SYNDROMES **Multiple Endocrine Neoplasia, Type 1** **Multiple Endocrine Neoplasia, Type 2** PINEAL GLAND **Pinealomas**	
	The Skin	
	The Skin: More Than a Mechanical Barrier **Defi nitions of Macroscopic Terms** **Defi nitions of Microscopic Terms** **Disorders of Pigmentation and Melanocytes** **Freckle (Ephelis)** **Lentigo** **Melanocytic Nevus (Pigmented Nevus, Mole)** **Dysplastic Nevi** **Melanoma** **Benign Epithelial Tumors** **Seborrheic Keratoses** **Acanthosis Nigricans** **Fibroepithelial Polyp** **Epithelial Cyst (Wen)** **Adnexal (Appendage) Tumors** **Premalignant and Malignant Epidermal Tumors** **Actinic Keratosis** **Squamous Cell Carcinoma** **Basal Cell Carcinoma** **Tumors of the Dermis** **Benign Fibrous Histiocytoma (Dermatofi broma)** **Dermatofi brosarcoma Protuberans** **Tumors of Cellular Migrants to the Skin** **Mycosis Fungoides (Cutaneous T-Cell Lymphoma)** **Mastocytosis** **Disorders of Epidermal Maturation** **Ichthyosis** **Acute Infl ammatory Dermatoses** **Urticaria** **Acute Eczematous Dermatitis** **Erythema Multiforme** **Chronic Infl ammatory Dermatoses** **Psoriasis** **Seborrheic Dermatitis** **Lichen Planus** **Blistering (Bullous) Diseases** **Infl ammatory Blistering Disorders** *Pemphigus* *Bullous Pemphigoid* *Dermatitis Herpetiformis* **Noninfl ammatory Blistering Disorders** *Epidermolysis Bullosa and Porphyria* **Disorders of Epidermal Appendages**	SIS + Tutorial + Practical

	Acne Vulgaris **Rosacea** **Panniculitis** **Erythema Nodosum and Erythema Induratum** **Infection** **Verrucae (Warts)** **Molluscum Contagiosum** **Impetigo** **Superfi cial Fungal Infections**	
	Bones, Joints, and Soft-Tissue Tumors	
	BONES **Bone Modeling, Remodeling, and Peak Bone Mass** **Bone Growth and Development** **Developmental Abnormalities in Bone Cells, Matrix, and Structure** **Malformations and Diseases Caused by Defects in Nuclear Proteins and Transcription Factors** **Diseases Caused by Defects in Hormones and Signal Transduction Mechanisms** **Diseases Associated with Defects in Extracellular Structural Proteins** *Type 1 Collagen Diseases (Osteogenesis Imperfecta)* *Diseases Associated with Mutations of Types 2, 9, 10, and 11 Collagen* **Diseases Associated with Defects in Folding and Degradation of Macromolecules** *Mucopolysaccharidoses* **Diseases Associated with Defects in Metabolic Pathways (Enzymes, Ion Channels, and Transporters)** *Osteopetrosis* **Diseases Associated with Decreased Bone Mass** *Osteoporosis* **Diseases Caused by Osteoclast Dysfunction** *Paget Disease (Osteitis Deformans)* **Diseases Associated with Abnormal Mineral Homeostasis** *Rickets and Osteomalacia* *Hyperparathyroidism* *Renal Osteodystrophy* **Fractures** **Osteonecrosis (Avascular Necrosis)** **Infections—Osteomyelitis** **Pyogenic Osteomyelitis** **Tuberculous Osteomyelitis** **Skeletal Syphilis** **Bone Tumors and Tumor-Like Lesions** **Bone-Forming Tumors** *Osteoma* *Osteoid Osteoma and Osteoblastoma*	SIS + Tutorial + Practical

Osteosarcoma
Cartilage-Forming Tumors
Osteochondroma
Chondromas
Chondroblastoma
Chondromyxoid Fibroma
Chondrosarcoma
Fibrous and Fibro-Osseous Tumors
Fibrous Cortical Defect and Non-Ossifying Fibroma
Fibrous Dysplasia
Fibrosarcoma Variants
Miscellaneous Tumors
Ewing Sarcoma/Primitive Neuroectodermal Tumor
Giant-Cell Tumor
Aneurysmal Bone Cyst
Metastatic Disease

JOINTS

Arthritis
Osteoarthritis
Rheumatoid Arthritis
Juvenile Idiopathic Arthritis
Seronegative Spondyloarthropathies
Ankylosing Spondyloarthritis
Reiter Syndrome
Enteritis-Associated Arthritis
Psoriatic Arthritis
Infectious Arthritis
Bacterial Arthritis
Tuberculous Arthritis
Lyme Arthritis
Viral Arthritis
Crystal-Induced Arthritis
Gout and Gouty Arthritis
Calcium Pyrophosphate Crystal Deposition Disease (Pseudo-Gout)
Tumors and Tumor-Like Lesions
Ganglion and Synovial Cyst
Tenosynovial Giant-Cell Tumor (Localized and Diffuse)

SOFT-TISSUE TUMORS AND TUMOR-LIKE LESIONS

Pathogenesis and General Features
Fatty Tumors
Lipomas
Liposarcoma
Fibrous Tumors and Tumor-Like Lesions
Reactive Pseudosarcomatous Proliferations
Nodular Fasciitis
Myositis Ossifi cans
Fibromatoses
Superfi cial Fibromatosis (Palmar, Plantar, and Penile Fibromatoses)
Deep-Seated Fibromatosis (Desmoid Tumors)
Fibrosarcoma
Fibrohistiocytic Tumors
Benign Fibrous Histiocytoma (Dermatofi broma)

	Malignant Fibrous Histiocytoma **Tumors of Skeletal Muscle** **Rhabdomyosarcoma** **Tumors of Smooth Muscle** **Leiomyomas** **Leiomyosarcoma** **Synovial Sarcoma**	
	Peripheral Nerve and Skeletal Muscle	
	General Reactions of the Motor Unit **Segmental Demyelination** **Axonal Degeneration and Muscle Fiber Atrophy** **Nerve Regeneration and Reinnervation of Muscle** **Reactions of the Muscle Fiber** **Diseases of Peripheral Nerve** **Infl ammatory Neuropathies** *Immune-Mediated Neuropathies* **Infectious Polyneuropathies** *Leprosy (Hansen Disease)* *Diphtheria* *Varicella-Zoster Virus* **Hereditary Neuropathies** *Hereditary Motor and Sensory Neuropathy Type I* *Other Hereditary Motor and Sensory Neuropathies* **Acquired Metabolic and Toxic Neuropathies** *Peripheral Neuropathy in Adult-Onset Diabetes Mellitus* *Metabolic and Nutritional Peripheral Neuropathies* *Neuropathies Associated with Malignancy* *Toxic Neuropathies* **Traumatic Neuropathies** **Tumors of Peripheral Nerve** **Diseases of Skeletal Muscle** **Denervation Atrophy** *Spinal Muscular Atrophy (Infantile Motor Neuron Disease)* **Muscular Dystrophies** *X-Linked Muscular Dystrophy (Duchenne Muscular Dystrophy and Becker Muscular Dystrophy)* *Other Muscular Dystrophies* *Myotonic Dystrophy* **Ion Channel Myopathies (Channelopathies)** **Congenital Myopathies** **Myopathies Associated with Inborn Errors of Metabolism** *Lipid Myopathies* *Mitochondrial Myopathies (Oxidative Phosphorylation Diseases)* **Infl ammatory Myopathies** *Noninfectious Infl ammatory Myopathies* **Toxic Myopathies** *Thyrotoxic Myopathy*	SIS + Tutorial

	Ethanol Myopathy *Drug-Induced Myopathies* **Diseases of the Neuromuscular Junction** *Myasthenia Gravis* *Lambert-Eaton Myasthenic Syndrome* **Tumors of Skeletal Muscle**	
	The Central Nervous System	
	Cellular Responses to Injury **Cerebral Edema, Hydrocephalus, and Raised Intracranial Pressure and Herniation** **Cerebral Edema** **Hydrocephalus** **Raised Intracranial Pressure and Herniation** **Malformations and Developmental Diseases** **Neural Tube Defects** **Forebrain Anomalies** **Posterior Fossa Anomalies** **Syringomyelia and Hydromyelia** **Perinatal Brain Injury** **Trauma** **Skull Fractures** **Parenchymal Injuries** *Concussion* *Direct Parenchymal Injury* *Diffuse Axonal Injury* **Traumatic Vascular Injury** *Epidural Hematoma* *Subdural Hematoma* **Sequelae of Brain Trauma** **Spinal Cord Trauma** **Cerebrovascular Diseases** **Hypoxia, Ischemia, and Infarction** *Hypotension, Hypoperfusion, and Low-Flow States (Global Cerebral Ischemia)* *Infarction from Obstruction of Local Blood Supply (Focal Cerebral Ischemia)* **Hypertensive Cerebrovascular Disease** *Lacunar Infarcts* *Slit Hemorrhages* *Hypertensive Encephalopathy* **Intracranial Hemorrhage** *Intracerebral (Intraparenchymal) Hemorrhage* *Subarachnoid Hemorrhage and Ruptured Saccular Aneurysms* *Vascular Malformations* **Infections** **Acute Meningitis** *Acute Pyogenic (Bacterial) Meningitis* *Acute Aseptic (Viral) Meningitis* **Acute Focal Suppurative Infections** *Brain Abscess* *Subdural Empyema* *Extradural Abscess*	SIS + Tutorial + Practical

	Chronic Bacterial Meningoencephalitis *Tuberculosis* *Neurosyphilis* *Neuroborreliosis (Lyme Disease)* **Viral Meningoencephalitis** *Arthropod-Borne Viral Encephalitis* *Herpes Simplex Virus Type 1* *Herpes Simplex Virus Type 2* *Varicella-Zoster Virus (Herpes Zoster)* *Cytomegalovirus* *Poliomyelitis* *Rabies* *Human Immunodefi ciency Virus* *Progressive Multifocal Leukoencephalopathy* *Subacute Sclerosing Panencephalitis* **Fungal Meningoencephalitis** **Other Infectious Diseases of the Nervous System** **Transmissible Spongiform Encephalopathies (Prion Diseases)** **Demyelinating Diseases** **Multiple Sclerosis** **Neuromyelitis Optica** **Acute Disseminated Encephalomyelitis and Acute Necrotizing Hemorrhagic Encephalomyelitis** **Other Diseases with Demyelination** **Degenerative Diseases** **Degenerative Diseases Affecting the Cerebral Cortex** *Alzheimer Disease* *Frontotemporal Dementias* *Vascular Dementia* **Degenerative Diseases of Basal Ganglia and Brainstem** *Parkinsonism* *Parkinson Disease* *Dementia with Lewy Bodies* *Multiple System Atrophy* *Huntington Disease* **Spinocerebellar Degenerations** *Spinocerebellar Ataxias* **Degenerative Diseases Affecting Motor Neurons** *Amyotrophic Lateral Sclerosis (ALS; Motor Neuron Disease)* *Bulbospinal Atrophy (Kennedy Syndrome)* *Spinal Muscular Atrophy* **Genetic Metabolic Diseases** **Neuronal Storage Diseases** *Neuronal Ceroid Lipofuscinoses* *Tay-Sachs Disease* **Leukodystrophies** *Krabbe Disease* *Metachromatic Leukodystrophy* *Adrenoleukodystrophy* *Pelizaeus-Merzbacher Disease* *Canavan Disease* *Alexander Disease* *Vanishing-White-Matter Leukodystrophy*	

	Mitochondrial Encephalomyopathies *Mitochondrial Encephalomyopathy, Lactic Acidosis, and Strokelike Episodes* *Myoclonic Epilepsy and Ragged Red Fibers* *Leigh Syndrome (Subacute Necrotizing Encephalopathy)* *Kearn-Sayre Syndrome* *Alpers Disease* **Toxic and Acquired Metabolic Diseases** **Vitamin Defi ciencies** *Thiamine (Vitamin B_1) Defi ciency* *Vitamin B_{12} Defi ciency* **Neurologic Sequelae of Metabolic Disturbances** *Hypoglycemia* *Hyperglycemia* *Hepatic Encephalopathy* **Toxic Disorders** *Carbon Monoxide* *Methanol* *Ethanol* *Radiation* *Combined Methotrexate and Radiation-Induced Injury* **Tumors** **Gliomas** *Astrocytoma* *Oligodendroglioma* *Ependymoma and Related Paraventricular Mass Lesions* **Neuronal Tumors** **Poorly Differentiated Neoplasms** *Medulloblastoma* *Atypical Teratoid/Rhabdoid Tumor* **Other Parenchymal Tumors** *Primary CNS Lymphoma* *Germ Cell Tumors* *Pineal Parenchymal Tumors* **Meningiomas** **Metastatic Tumors** **Paraneoplastic Syndromes** **Peripheral Nerve Sheath Tumors** *Schwannoma* *Neurofi broma* *Malignant Peripheral Nerve Sheath Tumor* **Familial Tumor Syndromes** *Neurofi bromatosis Type 1* *Neurofi bromatosis Type 2* *Tuberous Sclerosis Complex* *Von Hippel–Lindau Disease*	
	The Eye	
	Orbit **Functional Anatomy and Proptosis** **Thyroid Ophthalmopathy (Graves Disease)** **Other Orbital Infl ammatory Conditions** **Neoplasms**	SIS + Tutorial + Practical

	Eyelid **Functional Anatomy** **Neoplasms** **Conjunctiva** **Functional Anatomy** **Conjunctival Scarring** **Pinguecula and Pterygium** **Neoplasms** **Sclera** **Cornea** **Functional Anatomy** **Keratitis and Ulcers** **Corneal Degenerations and Dystrophies** *Band Keratopathies* *Keratoconus* *Fuchs Endothelial Dystrophy* *Stromal Dystrophies* **Anterior Segment** **Functional Anatomy** **Cataract** **The Anterior Segment and Glaucoma** **Endophthalmitis and Panophthalmitis** **Uvea** **Uveitis** **Neoplasms** *Uveal Nevi and Melanomas* **Retina and Vitreous** **Functional Anatomy** **Retinal Detachment** **Retinal Vascular Disease** *Hypertension* *Diabetes Mellitus* *Retinopathy of Prematurity (Retrolental Fibroplasia)* *Sickle Retinopathy, Retinal Vasculitis, Radiation Retinopathy* *Retinal Artery and Vein Occlusions* **Age-Related Macular Degeneration** **Other Retinal Degenerations** *Retinitis Pigmentosa* **Retinitis** **Retinal Neoplasms** *Retinoblastoma* *Retinal Lymphoma* **Optic Nerve** **Anterior Ischemic Optic Neuropathy** **Papilledema** **Glaucomatous Optic Nerve Damage** **Other Optic Neuropathies** **Optic Neuritis** **The End-Stage Eye: Phthisis Bulbi**	
	Haematology & Blood Transfusion	
	Diseases of White Blood Cells, Lymph Nodes, Spleen, and Thymus	SIS + Tutorial + Practical
	Development and Maintenance of Hematopoietic Tissues DISORDERS OF WHITE CELLS **Leukopenia** **Neutropenia, Agranulocytosis**	SIS + Tutorial + Practical

	Reactive (Infl ammatory) Proliferations of White Cells and Lymph Nodes **Leukocytosis** **Lymphadenitis** *Acute Nonspecifi c Lymphadenitis* *Chronic Nonspecifi c Lymphadenitis* **Neoplastic Proliferations of White Cells** **Etiologic and Pathogenetic Factors in White Cell Neoplasia: Overview** **Lymphoid Neoplasms** *Defi nitions and Classifi cations* *Precursor B- and T-Cell Neoplasms* *Peripheral B-Cell Neoplasms* *Peripheral T-Cell and NK-Cell Neoplasms* *Hodgkin Lymphoma* **Myeloid Neoplasms** *Acute Myeloid Leukemia* *Myelodysplastic Syndromes* *Myeloproliferative Disorders* **Langerhans Cell Histiocytosis** SPLEEN **Splenomegaly** **Nonspecifi c Acute Splenitis** **Congestive Splenomegaly** **Splenic Infarcts** **Neoplasms** **Congenital Anomalies** **Rupture** THYMUS **Developmental Disorders** **Thymic Hyperplasia** **Thymomas**	
	Red Blood Cell and Bleeding Disorders	
	Anemias **Anemias of Blood Loss** *Acute Blood Loss* *Chronic Blood Loss* **Hemolytic Anemias** *Hereditary Spherocytosis (HS)* *Hemolytic Disease Due to Red Cell Enzyme Defects: Glucose-6-Phosphate Dehydrogenase Defi ciency* *Sickle Cell Disease* *Thalassemia Syndromes* *Paroxysmal Nocturnal Hemoglobinuria* *Immunohemolytic Anemia* *Hemolytic Anemia Resulting from Trauma to Red Cells* **Anemias of Diminished Erythropoiesis** *Megaloblastic Anemias* *Iron Defi ciency Anemia* *Anemia of Chronic Disease* *Aplastic Anemia* *Pure Red Cell Aplasia* *Other Forms of Marrow Failure* **Polycythemia** **Bleeding Disorders: Hemorrhagic**	SIS + Tutorial + Practical

	Diatheses **Bleeding Disorders Caused by Vessel Wall Abnormalities** **Bleeding Related to Reduced Platelet Number: Thrombocytopenia** *Chronic Immune Thrombocytopenic Purpura* *Acute Immune Thrombocytopenic Purpura* *Drug-Induced Thrombocytopenia* *HIV-Associated Thrombocytopenia* *Thrombotic Microangiopathies: Thrombotic Thrombocytopenic Purpura (TTP) and Hemolytic-Uremic Syndrome (HUS)* **Bleeding Disorders Related to Defective Platelet Functions** **Hemorrhagic Diatheses Related to Abnormalities in Clotting Factors** *The Factor VIII-vWF Complex* *Von Willebrand Disease* *Hemophilia A (Factor VIII Defi ciency)* *Hemophilia B (Christmas Disease, Factor IX Defi ciency)* **Disseminated Intravascular Coagulation (DIC)**	
	Cytology	
	Introduction	SIS + Tutorial + Practical
	The techniques of FNA Cytology, i) Basic Techniques, ii) Miscellaneous techniques	SIS + Tutorial + Practical
	Imaging methods for guidance of aspiration cytology	SIS + Tutorial + Practical
	Head & Neck, salivary glands	SIS + Tutorial + Practical
	Lymph nodes	SIS + Tutorial + Practical
	Thyroid	SIS + Tutorial + Practical
	Breast	SIS + Tutorial + Practical
	Lung, chest wall and pleura	SIS + Tutorial + Practical
	Mediastinum	SIS + Tutorial + Practical
	Liver and spleen	SIS + Tutorial + Practical
	Pancreas, biliary tract and intra-abdoinal organs	SIS + Tutorial + Practical
	Kidney, adrenal and retroperitoneum proper	SIS + Tutorial + Practical
	Male and female genital tract **i) Male genital tract, prostate and testis** **ii) Female genital tract**	SIS + Tutorial + Practical

	Skin and subcutis	SIS + Tutorial + Practical
	Soft tissues	SIS + Tutorial + Practical
	Bone	SIS + Tutorial + Practical
	Pediatric tumours	SIS + Tutorial + Practical
	infectious Diseases	SIS + Tutorial + Practical

Annexure 1

Postgraduate Students Appraisal Form
Para Clinical Discipline

Name of the Department/Unit :
Name of the PG Student :
Period of Training : FROM……TO……

Sr. No.	PARTICULARS	Not Satisfactory 1 2 3	Satisfactory 4 5 6	More Than Satisfactory 7 8 9	Remarks
1	Journal based / recent advances learning				
2	Patient based /Laboratory or Skill based learning				
3	Self directed learning and teaching				
4	Departmental and interdepartmental learning activity				
5	External and Outreach Activities / CMEs				
6	Thesis / Research work				
7	Log Book Maintenance				

Publications **Yes/ No**

Remarks* _____

***REMARKS: Any significant positive or negative attributes of a postgraduate student to be mentioned. For score less than 4 in any category, remediation must be suggested. Individual feedback to postgraduate student is strongly recommended.**

SIGNATURE of ASSESSEE **SIGNATURE OF CONSULTANT** **SIGNATURE OF HOD**