Jordan University of Science and Technology

Faculty of Medicine
2018-2019

COURSE TITLE :	**GENERAL PATHOLOGY.**
COURSE CODE :	**MED 231.**
CREDIT HOURS :	**3 CREDIT HOURS**
SEQUENCE :	**YEAR 2, FIRST SEMESTER**
COURSE COORDINATOR:	**Dr. Alia AlMuhtaseb; Dr. Mohammad Orjani**
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Course Description:

This course deals with the investigation of those pathological mechanisms common to all tissue-cell pathology. Attention is paid to the processes of cellular adaptation, inflammation, repair, immunology, cellular accumulation, and neoplasia.

Lecture will attempt first to familiarize the student with our basic layers of defense. Next those vocabulary terms and concepts relevant to the disease process will be introduced. The terminology employed is both medical and chiropractic. Processes and concepts will be developed with the aid of Data show. An interactive format is employed in which the instructor poses questions to enable the student to self-test their knowledge prior to exams and develop skills in communicating these basic pathological concepts to others. During the course and whenever relevant the students are exposed to clinical problems to emphasize the explanations of symptoms, signs, investigations and forms of treatments. Practical sessions are planned to give students the opportunity to expose their knowledge for discussion and confirm concepts learned in lectures. Small group discussions of clinical cases are planned at the end of the course were students are divided into small groups and with the help of an instructor they analyze and discuss the problem.

The course will be given through 28 lectures, 7 practical (laboratory) sessions, and one small group discussion activity over 15 weeks and for one whole semester. The teaching should take an interactive pattern engaging basic clinical knowledge with clinical scenarios and appropriate laboratory investigations. Assessment of achievement is through three written exams of multiple choice question (MCQ) type. The first exam is conducted at week 5, the second exam at week 10, and the final exam at week 15 (last week). Each exam is composed of 30 questions (3/lecture).

The activity of small group discussion (SGD) of clinical cases is planned at the end of the course were students are divided into small groups and with the help of an instructor they analyze and discuss an actual case-problem of daily practice in relation to topics discussed in the course.

Course Learning Outcomes

1. Understanding of basic pathology including:
    - Define cell injury and explain patterns of cell injury
    - Explain patterns of cell adaptation, necrosis and necrotic patterns
    - Inflammatory processes, acute and chronic.
    - Patterns of tissue repair and fibrosis
    - Introduce abnormalities of growth
    - Introduce tumor nomenclature

2. Demonstrate understanding of basic concepts of hematology and immunology

Recommended Textbook:

Subject	Book (Resources)
Pathology	1. Robbins Basic Pathology - 10th Edition - Elsevier

Learning Objectives

(A) Lectures objectives

1	**Orientation and introductory meeting**	1. Understand the general outline of the M231 course. 2. Be familiar with the modalities of teaching throughout the course. 3. Be familiar with the grading system and passing requirements of the course. 4. Be familiar with Do's and Don'ts in this course 5. Staff members will introduce a brief introduction about each topic.
2	**Cell injury**	1. List causes of cell injury, 2. Understand the concept of reversible and irreversible. 3. Describe the morphological changes in reversible and irreversible injuries 4. Define adaptation and list the most common types 5. Define hyperplasia, hypertrophy, atrophy, metaplasia and list causes with example.
3	**Cell injury**	1. Describe lipid, protein and glycogen accumulation in cells. 2. List endogenous and exogenous pigments. 3. List examples of dystrophic and metastatic calcification. 4. Define necrosis, autolysis, heterolysis and apoptosis.
4	**Cell injury**	1. Describe the morphology of necrosis and List types of necrosis with examples 2. Describe the morphology and mechanism of apoptosis, list causes of apoptosis with example. 3. Describe theories of aging.
5	**Cell injury**	1. Compare and contrast ischemia and hypoxia and discuss the time course of the molecular events that occur in a cell in response to lack of oxygen, emphasizing the events that distinguish reversible from irreversible injury. 2. List the types of subcellular alterations that can occur in cell injury, with respect to the following organelles, lysosomes, endoplasmic reticulum, mitochondria and cytoskeleton. 3. Compare and contrast the following types of cell injury: free radical-induced, chemical in terms of biochemical and molecular mechanisms.

6	**Cell injury**	1. Apply knowledge of biochemistry and cellular physiology to differentiate between pathogenic and physiologic mechanisms of cell death, the resulting morphologic appearance, and the physiologic and clinical settings in which these mechanisms are activated 2. Summarize the cell's response to reperfusion injury emphasizing how reperfusion can exacerbate injury produced by ischemia.
7	**Cell injury**	1. Discuss the significance of intracellular accumulations of: lipids, proteins, glycogen, pigments (exogenous and endogenous). 2. Describe the mechanisms of intracellular accumulations and the morphologic and clinical consequences of these accumulations. 3. Compare fatty change (steatosis) and fatty infiltration on the basis of: causes, pathogenesis, organs commonly involved and histologic appearances. 4. Compare dystrophic and metastatic calcification in terms of: definition, etiology and pathogenesis morphologic appearance, sites and associated diseases and clinical significance.
8	**Acute inflammation**	1. List the five cardinal signs of inflammation. 2. Describe the events that occur during acute inflammation. 3. List chemical mediators that are involved in inflammation. 4. List possible outcomes of acute inflammation. 5. List causes of chronic inflammation.
9	**Acute inflammation**	1. Describe the morphology of chronic inflammation. 2. Describe the morphology of granulomatous inflammation. 3. Describe two types of giant cells. 4. List causes of granulomatous inflammation.
10	**Acute inflammation**	1. List examples of serous inflammation. 2. Be able to define: pus, an abscess, and an ulcer. 3. Describe the morphology of an ulcer. 4. List the systemic effects of inflammation.
11	**Inflammation and repair**	1. Describe two types of tissue repair. 2. Describe the cell cycle and factors controlling it. 3. Define and give examples of labile, stable and permanent cells. 4. Define stem cells, know their main types, giving examples, and list some of their applications in medicine.
12	**Inflammation and repair**	1. Understand function, structure and components of the extracellular matrix. 2. Describe fibrosis. 3. Describe healing by first and second intention. 4. List local and systemic factors that affect wound healing.

13	**Inflammation and repair**	1. List complications of healing. 2. Identify the basal ganglia nuclei. 3. Identify main parts of the diencephalon and name the main functions of each part 4. Describe the cortical areas related to the written and spoken language.
14	**Neoplasia**	1. Define and use in proper context: 2. neoplasia, neoplasm, tumor, cancer; oncology, benign vs. malignant. 3. parenchymal cell, stroma, desmoplasia, scirrhous tumor, mixed tumor; fibroadenoma, teratoma, choristoma vs. hamartoma, blastoma 4. Discuss the following: 5. dysplasia, anaplasia, in situ carcinoma with specific examples invasion, metastasis 6. Outline the classification and nomenclature for benign and malignant neoplasms, using appropriate prefixes and suffixes and indicating specific exceptions to rules of nomenclature. 7. Compare and contrast the following in terms of tissue of origin: normal vs. neoplastic tissue, adenoma vs. carcinoma, carcinoma vs. sarcoma 8. Discuss precancerous lesions (incipient malignancies), in terms of: a. definition b. etiology c. pathogenesis/growth kinetics d. common examples
15	**Neoplasia**	1. Discuss the epidemiology of benign and malignant neoplasms, in terms of: 2. incidence prevalence geographic associations, environmental factors, age associations and heredity 3. Cite examples of variations in types of neoplasms and incidence of neoplasms related to: a. geographic location b. age c. sex d. race e. occupation f. socioeconomic status 4. Compare and contrast: acquired cancer-causing genetic mutations germline cancer-causing genetic mutations 5. Compare and contrast grading vs. staging of neoplastic disease, in terms of: general principles and clinical significance

16	**Neoplasia**	1. List the general karyotypic, and molecular genetic changes found in neoplastic cells. Discuss the following chromosomal translocations: t (8;14) & t (9;22) 2. Describe the metaplasia-dysplasia-carcinoma-in-situ-invasive carcinoma sequence. 3. Discuss the following theory of origin of neoplasia: multifactorial theory. 4. Discuss the relationship between protooncogenes and oncogenes. 5. Compare and contrast protooncogenes and tumor suppressor genes, in terms of genotypic vs. phenotypic expression.
17	**Neoplasia**	1. Describe the following oncogenes: *ras, BCR-ABL, myc,* c-*erbB* in terms of: chromosomal location, mechanisms of oncogenesis, associated neoplasms 2. Describe the following tumor suppressor genes: *Rb, TP53 and* APC 3. in terms of: chromosomal location, mechanisms of oncogenesis, associated neoplasms 4. Discuss metastasis of malignant neoplasms 5. Evaluate critically the role of each of the following in the development of human cancer, citing general significance and at least one specific neoplasm associated with each: ➢ physical agents chemical agents infectious agents chronic inflammatory conditions benign tumors 6. genetic diseases genetic predispositions hormones immune response
18	**Neoplasia**	1. Match the following agents or conditions with neoplasms for which there has been a suggested relationship: cyclophosphamide, tobacco, aflatoxin, asbestos benzene, 2-naphthylamine, vinyl chloride, Helicobacter *pylori,* hepatitis B and C viruses, Epstein-Barr virus, human papillomavirus (HPV), human immunodeficiency virus (HIV), human T cell leukemia/lymphoma virus, type 1 (HTLV-1), ultraviolet radiation, ionizing radiation radon 2. List the DNA viruses which have been linked to tumor formation in man and animals. 3. List the connections between viruses and tumors in terms of: • epidemiology • interactions of virus proteins with cell regulatory proteins • modulation of the host immune system

		4. Describe the following cancer-susceptibility syndromes: xeroderma pigmentosum, hereditary nonpolyposis colon cancer 5. in terms of: o genetic abnormality o mechanisms of oncogenesis 6. clinical features of associated neoplasms
19	**Neoplasia**	1. Explain the carcinogenic effect of irradiation. 2. Describe the body's immune system and its role in the development of neoplasms 3. Discuss the different types of escape mechanisms utilized by neoplasms to evade the immunosurveillance system of an immunocompetent host. 4. 4. Discuss tumor specific antigens and tumor related antigens
20	**Neoplasia**	1. Describe the indications, advantages, and disadvantages of the following diagnostic procedures and laboratory tests used to diagnose, and monitor the progression of, neoplasms: a. Imaging b. Histologic c. Cytologic i. exfoliative cytology ii. fine needle aspiration (FNA) cytology d. Biochemical: tumor markers e. Molecular 2. List the secretions or other fluids which are examined by cytologic means in the diagnosis of malignancy.
21	**Neoplasia**	1. List the organs in which cytology plays an important role in cancer case findings. 2. Cite at least three examples of paraneoplastic syndromes. 3. Match each of the following tumor markers with the specific neoplasm(s) with which it is associated: a. human chorionic gonadotrophin (HCG) b. α-fetoprotein (AFP)
22	**Neoplasia**	1. Contrast the effects of benign and malignant tumors on the host. 2. List the common signs and symptoms of malignancy. 3. List the common causes of death from cancer.
23	**Hemodynamic disorders**	1. Define edema, hydrothorax, hydropericardium, hydroperitoneum, pleural effusion, pericardial effusion, ascites, anasarca, exudate and transudate and describe the morphology with examples 2. List causes of Edema and discuss them with examples 3. Define hyperemia and congestion and contrast them. 4. Describe the morphology of pulmonary congestion and liver congestion.

24	**Hemodynamic disorders**	1. Define hemorrhage and related terms - hemorrhagic diathesis, hematoma, petechiae, purpura, ecchymoses, hemothorax, hemopericardium, hemoperitoneum, and hemarthrosis, and list causes of hemorrhage 2. Define hemostasis and describe steps in hemostasis and the role of endothelial cells and platelets in hemostasis and understand the coagulation cascade 3. Define thrombosis and understand the factors influence thrombus formation and Understand the fate of thrombi and their complications 4. List conditions of hypercoagulability state
25	**Hemodynamic disorders**	1. List conditions of hypercoagulability state 2. Define Venous Thrombosis and embolism, list types, causes and consequences with examples 3. Know the meaning of infarction and its causes and be familiar with the morphology of infarction.
26	**Hemodynamic disorders**	1. Know the basic pathophysiology and the major clinical manifestations of shock and know the three main types of shock (the three main pathogenetic mechanisms) and their clinical stages

(B) Labs objectives

Title	Objectives
Cell injury 1	• **Identify Cell Histology** 1. Cell structure 2. Cell components 3. Cell connections • **Identify Cell Adaptation mechanisms** 1. Atrophy 2. Hypertrophy 3. Hyperplasia 4. Metaplasia 5. Dysplasia
Cell injury 2	• **Identify Cell Death Mechanisms** 1. Apoptosis 2. Necrosis and its subtypes • **Identify Types of Cellular Accumulations**
Inflammation 3	• **Identify features of Inflammation**

	• **Discuss inflammation, acute and chronic and related complications**
Inflammation 4	• **Identify features and types of healing processes**
Neoplasia 5	• **Identify Reversible and irreversible cellular alteration** • **Identify examples of benign neoplasms** • **Identify examples of malignant neoplasms**
Neoplasia 6	• **Metastasis** • **Biochemical characteristics of Neoplasms**
Hemodynamic Disorders 7	• **Atherosclerosis** • **Thromboembolism** • **Infarction** • **Coagulation**

Course Assessment

Assessment		
Assessment Type/Format	**Expected Due Date**	**Weight**
First (Theory and Practical) Exam/ MCQ	Week 5	**30%**
Second (Theory and Practical) Exam/ MCQ	Week 10	**30%**
Final (Theory and Practical) Exam/ MCQ	Week 15	**60%**
Total		**100**

Students Learning Outcomes

Student Learning Outcomes(SLOs) (4-8 Maximum) Upon successful completion of this course, students should be able to:			
SLOs	**Related ILO(s)* (numbers only)**	**Evaluation Criteria (MCQ, OSCE, Homework…)**	
		Type of Criteria (MCQ,)	**Weight (%)**
Demonstrate understanding of basic pathologic processes	**2,4**	**MCQ**	**30**
Demonstrate understanding of neoplasm, tumor, cancer, carcinogen, mutation, malignancy, and oncology	**7,8**	**MCQ**	**30**
Demonstrate understanding of basic concepts of hematology, thrombosis and coagulation	**4,7,8**	**MCQ**	**40**
			100

Intended Learning Outcomes (ILOs)

1) Demonstrate a sufficient understanding of the structural organization and functions of the following systems of the human body: circulatory, respiratory, gastrointestinal, endocrine, hematopoietic & lymphatic, musculoskeletal, nervous, and genitourinary systems.
2) Conceptualize the cellular, molecular, genetic, and biochemical mechanisms that maintain body's homeostasis and their derangements in disease states.
3) Apply their knowledge of human anatomy and function to solve questions regarding major clinical cases and diseases.
4) Attain appropriate and systematic clinical history of different medical conditions and settings.
5) Demonstrate proficiency in performing clinical skills and procedures.
6) Perform relevant physical examination on patients professionally and ethically.

7) Identify the major signs and symptoms of disease states, recognizing risk factors and etiologies, in an interdisciplinary approach to differentially diagnose patients.
8) Order and interpret results of relevant basic diagnostic procedures, such as laboratory investigations and conventional imaging procedures.
9) Apply safe and accurate methods of pharmacotherapy of major disease states.
10) Critically appraise research studies guided by evidence-based medicine.
11) Demonstrate ability to work in diverse settings and communities.