MED601:Block 1 | Course Objectives

Genes and Chromosomes
01GEN001 Compare and contrast the structural features, the properties and functions of the major types of nucleic acids - DNA, mRNA, tRNA, and ribosomal RNA, and the various non-coding RNAs (miRNA, siRNA and others).
01GEN002 Describe the organization and structure of chromosomes, and have a general knowledge of their replication, recombination, and the common chromosomal abnormalities seen clinically.
01GEN003 Describe the structure, organization, replication, and expression of a typical gene.
01GEN004 Describe the mechanisms for genetic information flow (transcription and translation), and the regulation of the processes.
01GEN005 Describe the molecular basis of the common types of gene mutations and the mechanisms for repair of mutations.
01GEN006 Explain the molecular basis and the use of the clinically-important methods for analysis of DNA including sequencing, PCR amplification, restriction analysis, and hybridization.
01GEN007 Compare and contract the molecular and chromosomal basis of the following modes of inheritance: Mendelian (single gene) vs. multifactorial inheritance; autosomal dominant vs. autosomal recessive inheritance; and autosomal vs. X-linked inheritance.
01GEN008 Describe the molecular mechanisms underlying mitochondrial inheritance, imprinting, gonadal mosaicism, and trinucleotide repeats.
01GEN009 Demonstrate a working knowledge of how pedigrees, gene linkage, gene mapping, DNA probes, and recombinant DNA technology are used in diagnosing and treating genetic disorders.
01GEN010 Describe the mechanism by which a relatively small number of genes can generate millions of different antibodies.

Proteins and Enzymes
01PRO001 Demonstrate a working knowledge of the structures, properties, and functions of the 20 common amino acids.
01PRO002 Describe the biosynthesis, post-translational modification, and targeting of proteins.
01PRO003 Compare and contrast the carbohydrate- and lipid-based modifications of proteins in terms of their effect on protein structure and function.
01PRO004 Describe the four levels of protein structure and predict how gene mutations could affect protein structure and function.

01PRO005 Describe the general mechanisms by which enzymes catalyze biochemical reactions.

01PRO006 Describe the roles of metals, vitamins, coenzymes, and prosthetic groups in enzymes.

01PRO007 Apply information about Km, Vmax, and Kcat to accurately describe enzyme activity.

01PRO008 Describe, compare, and contrast the modes of action of competitive, noncompetitive, and uncompetitive, and irreversible inhibitors of enzymes.

01PRO009 Describe the common mechanisms of regulation of enzyme activities in the cell.

01PRO010 Describe how enzymes are used clinically as diagnostic tools (e.g., heart attack, liver function, etc.).

**Metabolism**

01MET001 Describe the characteristic structures, properties, and functions of physiologically relevant carbohydrates and lipids.

01MET002 Demonstrate an understanding of the major concepts of bioenergetics and the role of energy in biological systems. Rationalize the properties of ATP and other "high-energy" compounds which are consistent with their roles in energy exchange in the cell.

01MET003 Describe the roles of oxygen, NADH, ATP, and mitochondria in the capture and transfer of energy.

01MET004 Describe the key features and regulation of central pathways for obtaining energy from metabolic fuels including glycolysis, the tricarboxylic acid cycle, and electron transport and oxidative phosphorylation.

01MET005 Describe the key features and regulation of pathways which provide substrate to the central pathways of energy metabolism (i.e. glycogenolysis, lipolysis, beta-oxidation, and amino acid degradation).

01MET006 Describe the key features and regulation of the metabolic pathways for the synthesis of energy rich molecules including gluconeogenesis, glycogenesis, and lipogenesis.

01MET007 Describe the key features of the pentose phosphate pathway and its relationship to anabolic reactions and glycolysis.

01MET008 Describe the important steps in amino acid degradation, including the urea cycle and the common diseases associated with defects in the pathway.

01MET009 Relate the transport mechanisms for cholesterol and triacylglycerol to key clinical chemistry indices of circulating lipids.

01MET010 Describe the mechanisms for regulating the synthesis, storage, and utilization of lipids and carbohydrates under a variety of physiologic states including fed, overfed, fasting, diabetic ketoacidotic, and exercising conditions.

01MET011 Describe the key features and regulation of the synthetic and degradative pathways for purine and pyrimidines.
01MET012  Describe the metabolism and transport of iron emphasizing factors to accommodate the unique characteristics and role of the metal.

**Membranes, Cellular Signaling, and Therapeutic Interventions**

01MEM001  Identify the major components of a biological membrane and the structural and functional relationships between them.

01MEM002  Describe the mechanisms by which various endogenous and exogenous substances cross cell membranes.

01MEM003  Describe the mechanisms involved in the turnover and recycling of membranes and their constituents.

01MEM004  Describe the process of membrane vesicle formation and the principles of vesicle trafficking.

01MEM005  Describe the role cellular receptors play in cell-cell communication and initiation of intracellular signaling.

01MEM006  Describe the characteristics of ligand-receptor interactions involving endogenous and exogenous ligands, agonists, and antagonists.

01MEM007  Describe the common second messenger systems and their roles in signal transduction.

01MEM008  Describe how ligand-initiated receptor-mediated responses are terminated.

01MEM009  Apply the principles of pharmacodynamics and pharmacokinetics in drug therapy.

01MEM010  Describe the influence of environmental and host factors on drug responses.

**Cell Biology**

01CBI001  Describe the stages and regulation of the cell cycle and the role of the cycle in cell division and differentiation.

01CBI002  Describe the architecture of the eukaryotic cell including cell-to-cell and cell-to-matrix interactions.

01CBI003  Describe the mechanism of eukaryotic cell migration.

01CBI004  Compare and contrast prokaryotic and eukaryotic cell structures and explain how their differences are exploited in the use of antibacterial agents.

01CBI005  Identify, classify, compare, and contrast the types and functions of epithelia.

01CBI006  Describe the molecular and cellular components of blood and their functions.

01CBI007  Describe the development, structure, function, and repair of bone.

01CBI008  Understand the structure and function of bone marrow including the differentiation and development of blood cells (hemopoiesis).
**Early Development**

01DEV001  Compare and contrast the processes of mitosis and meiosis.

01DEV002  Describe human gametogenesis, fertilization and implantation.

01DEV003  Describe programmed gene expression and signal transduction mechanisms that are important during early human development.

01DEV004  Describe the role of cell migration in the developing embryo.

01DEV005  Describe the formation of the bilaminar and trilaminar embryonic discs and the development of body form.

01DEV006  Describe the development of the basic tissue types and the fate of primordial germ layers.

01DEV007  Describe the development and eventual fate of fetal membranes.

01DEV008  Describe the development, structure, and function of the placenta.

01DEV009  Describe the development of limbs.

01DEV010  Describe the major developmental events that occur during the first 8 weeks.

**Introduction of Human Anatomy**

01ANT001  Describe the various imaging techniques available for clinical diagnosis emphasizing the advantages and limitations of each.

01ANT002  Demonstrate a general working knowledge of surface anatomy and the basic segmental organization of the human body.

01ANT003  Demonstrate a working knowledge of surface and functional anatomy, using the upper extremity as the basic conceptual unit.

01ANT004  Describe the peripheral distribution and organization of the major vessels in the root of the neck.

01ANT005  Demonstrate a working knowledge of cervical anatomy with emphasis on laryngo-tracheoesophageal relationships and associated glands.

01ANT006  Describe the thoracic outlet including the peripheral neurovascular components and their relationships to the upper limb.

01ANT007  Demonstrate a working knowledge of the global architecture of the bony skeleton.

**Biomedical Ethics**

01BME001  Describe and demonstrate understanding of when, during medical practice, one may need to make use of utilitarian, deontological, and communitarian ethics.

01BME002  Describe and demonstrate understanding of challenges in applying ethical principles of autonomy, beneficence, non-maleficence, veracity, confidentiality, fidelity, and justice during medical practice.
01BME003  Describe and demonstrate understanding of how to approach bioethics case analysis
01BME004  Describe and demonstrate understanding of some of the challenges in dealing with medical errors, genetic testing, and the need to ration medical care
01BME005  Describe and demonstrate understanding of professional behaviors and attitudes by your ability to identify and describe ethical and professional values present in patient cases
01BME006  Describe and demonstrate understanding of cross-cultural communication and the medical encounter in terms of the ethical issues involved.

Clinical Genetics
01CLG001  Describe and demonstrate understanding of how to talk with families from a clinical genetics perspective about the indications for referral to a Clinical Genetics Clinic.
01CLG002  Describe and demonstrate understanding of how to talk with families from a clinical genetics perspective about the process of determining a diagnosis.
01CLG003  Describe and demonstrate understanding of about how to talk with families from a clinical genetics perspective about the process of genetic counseling.
01CLG004  Describe and demonstrate understanding of how to talk with families from a clinical genetics perspective about the approach for talking with a clinical genetics patient.

Clinical Skills
01CSK001  Perform a complete medical history on a standardized patient (SP)
01CSK002  Demonstrate through performance on a standardized patient the SIX content domains of the medical history and the questions specific to each domain
01CSK003  Demonstrate through performance on a standardized patient the first two elements of process that pertain to performing a patient-centered medical interview
01CSK004  Demonstrate through performance on a standardized patient interview how to obtain the patient's perspective of their illness
01CSK005  Through performance on a standardized patient medical interview, demonstrate the qualities of a therapeutic relationship
01CSK006  Demonstrate through performance of a standardized patient medical interview the specific communication techniques that (a) increase the accuracy of the information obtained during a medical interview and (b) help to create a positive, patient-centered doctor-patient relationship.

Communication Skills
01COM001  Describe and demonstrate understanding of how good communication skills and a positive doctor-patient relationship improve patient outcomes and patient satisfaction
01COM002  Describe and demonstrate understanding of specific communication techniques for increasing the accuracy of the information obtained during a medical interview.
01COM003 Describe and demonstrate understanding of specific communication techniques that foster a positive doctor-patient relationship, e.g., specific ways of expressing empathy, respect, partnership and collaboration, building trust, etc.

01COM004 Demonstrate understanding of the first two elements of process that pertain to performing a patient-centered medical interview.

01COM005 Demonstrate understanding of and the rationale for obtaining the patient's perspective of their illness.

01COM006 Describe specific communication techniques that (a) increase the accuracy of the information obtained during a medical interview and (b) help to create a positive, patient-centered doctor-patient relationship.

01COM007 Describe a strategy for delivering bad news that facilitates good communication between doctor and patient.

**Cultural Competency and Cross Cultural Medical Care**

01CCC001 Describe and demonstrate understanding of cross-cultural communication and the medical encounter in terms of the importance of cultural awareness; different decision-making models; the patient’s explanatory model.

01CCC002 Describe and demonstrate understanding of cross-cultural communication and the medical encounter in terms of the definition of culture and culturally-competent care; national standards for culturally-competent care.

01CCC003 Describe and demonstrate understanding of cross-cultural communication and the medical encounter in terms of the influence of knowledge, skills and attitudes.

01CCC004 Describe and demonstrate understanding of cross-cultural communication and the medical encounter in terms of the issues with verbal and non-verbal communication; stereotyping; misunderstandings.

01CCC005 Describe and demonstrate understanding of cross-cultural communication and the medical encounter in terms of the ethical issues.

01CCC006 Describe and demonstrate understanding of cross-cultural communication and the medical encounter in terms of the health literacy and how this influences medical care and the medical encounter, who is at risk, and how to address it.

**Doctor-Patient Relationship**

01DPR001 Describe and demonstrate understanding of the qualities that define a therapeutic relationship.

01DPR002 Describe and demonstrate understanding of what is meant by, “...by far the most frequently used drug in general practice is the doctor himself[herself]...” (Balint, 1957)

01DPR003 Describe and demonstrate understanding of the difference between illness and disease and how both doctor and patient bring expertise to the medical encounter.
01DPR004  Describe and demonstrate understanding of the similarities and differences between health and healing; curing and caring.

01DPR005  Describe specific communication techniques help to create a positive, patient-centered doctor-patient relationship.

**Medical History**

01MHX001  Describe and demonstrate understanding of the SIX major content domains of the medical history and questions specific to each domain

01MHX002  Describe and demonstrate understanding of the five elements of process that pertain to performing a patient-centered medical interview

01MHX003  Describe and demonstrate understanding of the difference as well as the interaction between content and process in the medical interview

01MHX004  Describe and demonstrate understanding of the four content domains that need to be explored in asking patients about their perspective on their illness

**Models of Care**

01MOC001  Describe and demonstrate understanding of the principles and dimensions of patient-centered care and the differences between doctor-centered and patient-centered care.

01MOC002  Describe and demonstrate understanding of past models regarding the nature of the doctor-patient relationship and how these compare to patient-centered care.

01MOC003  Describe and demonstrate understanding of the similarities and differences between the biomedical and biopsychosocial approaches to medical care.

**Nutrition**

01NUT001  Describe and demonstrate understanding of the health impact of the obesity epidemic in the U.S.

01NUT002  Describe and demonstrate understanding of evidence based data regarding the standard American diet and obesity.

01NUT003  Describe and demonstrate understanding of fuel body metabolism in terms of obesity, lipids and diabetes.

01NUT004  Describe and demonstrate understanding of the function of fat soluble (A,D,E) vitamins.

01NUT005  Describe and demonstrate understanding of the synthesis, dietary recommendations for vitamin D and evidence based clinical application regarding vitamin D.

**Patient Safety and Quality Improvement**

01PSQ001  In conducting the medical history on a standardized patient, WASH HANDS BEFORE GREETING/TOUCHING THE PATIENT AND PRIOR TO LEAVING THE ROOM. WASHING
HANDS BOTH TIMES IS REQUIRED IN ORDER TO PASS THE CLINICAL SKILLS EXAM: MISSING ONE OR BOTH RESULTS IN AN AUTOMATIC EXAM FAILURE.

Peer Teaching
01PTE001 Describe how and demonstrate the ability to give verbal and written feedback to peers pertaining to their performance of medical interviews on standardized patients.

Professionalism Professional Identity Formation
01PIF001 Describe and demonstrate understanding of the basic elements of professionalism, professional behavior, and professional oaths.
01PIF002 Describe and demonstrate understanding of some of the moral, ethical, cognitive and emotional factors involved in working with cadavers during medical training.
01PIF003 Describe and demonstrate understanding of professional behaviors and attitudes by your ability to identify and describe physicians’ professional behavior.
01PIF004 Describe and demonstrate understanding of professional behaviors and attitudes by your ability to identify and describe physicians’ patient-centered behaviors.
01PIF005 Describe and demonstrate understanding of professional behaviors and attitudes by your ability to identify and describe ethical and professional values present in patient cases.
01PIF006 Describe and demonstrate understanding of professional behaviors and attitudes by your ability to reflect on and name the qualities you want to develop as a physician by reflecting on and naming behaviors observed during case wrap up.
01PIF007 Describe and demonstrate understanding of professional behaviors and attitudes by your ability to reflect on and name the qualities you want to develop as a physician by developing a personal medical oath.

Subjective Experience of Illness
01SEI001 Describe why the disease-illness distinction is important for patient care in contemporary clinical medicine.
01SEI002 Describe the four content domains that need to be explored during a medical history in asking patients about their perspective on their illness
01SEI003 Describe the difference between active and passive coping and identify four active and four passive coping strategies. What types of coping tend to result in better and worse patient outcomes?

Social Determinants of Health
01SDH001 Describe the relationship between socioeconomic status and health outcomes in the US.
01SDH002 Identify some reasons behind the relationship between socioeconomic status and health outcomes.
01SDH003  Describe some approaches through which individual providers can address the health of populations.

01SDH004  Describe some approaches through which health systems and communities can address the health of populations.

**Patient Wrap-Up**

PWU-SEI001  Observe and reflect on the patient's experience with disease and the ways in which disease impacted the patient's occupation, finances, and family.

PWU-SEI002  Observe and reflect on patient's experience with the healthcare system.

PWU-SEI003  Observe and reflect on the coping skills used by the patient.

PWU-DPR001  Observe and evaluate the professional values exhibited by the physician.

PWU-DPR002  Observe and evaluate the communication skills of the physician.

PWU-DPR003  Observe and evaluate the patient-centeredness exhibited by the physician.

PWU-CSK001  Observe and evaluate the clinical reasoning skills exhibited by the physician.

PWU-CSK002  Apply basic science concepts to patient diagnoses and treatment.

**Patient-Centered Learning (PCL)**

PCL-CSK001  Demonstrate the ability to define and solve clinical problems based on a patient case.

PCL-CSK002  Demonstrate the ability to apply knowledge of basic sciences to clinical manifestations and presentation in a patient case.

PCL-CSK003  Demonstrate the ability to generate hypotheses based on the clinical presentation and underlying pathogenesis of disease in a patient case.

PCL-PTE001  Demonstrate the ability to actively listen to and reflect on information presented or discussed in learning objectives by other students.

PCL-PTE002  Demonstrate the ability to deliver concise, clear, scientifically-based presentations or discussions of learning objective topics.

PCL-PTE003  Demonstrate the ability to display knowledge of subject area in learning objective presentation that is beyond information covered in presentation or discussion.

PCL-PIF001  Demonstrate the ability to generate learning objectives based on deficiencies in the student's understanding of a patient case.

PCL-PIF002  Demonstrate the ability to gather evidence-based information from multiple resources that is relevant and sufficient to address learning issues generated from a patient case.

PCL-PIF003  Demonstrate responsibility to team through leadership and fulfillment of group duties.

PCL-PIF004  Demonstrate ability to assess learning needs, strengths, and limitations.

PCL-PIF005  Demonstrate ability to respond appropriately to feedback.
PCL-PIF006 Demonstrate ability to treat others in team with respect, show openness to different views, and discuss differences non-judgmentally.

PCL-PIF007 Demonstrate effort to continuously strive for excellence in all activities.