EPOM Overall Learning Objectives

By the end of the Essential Principles segment, the student will be able to:

Learning Objectives	WCM Core Competencies	Assessment Method(s)
Explain the basic principles of pharmacodynamics and pharmacokinetics, and describe the considerations a physician needs to address when prescribing therapeutics.	K-1; K-4	quiz
Describe the normal process and the pathological abnormalities associated with DNA replication, RNA transcription and protein translation.	K-1; K-2	quiz
Explain the principles of genetic inheritance, genetic disease pathogenesis and clinical features of key genetic, chromosomal and multifactorial conditions.	K-1; K-2	quiz
List the roles of genetic screening, and explain new developments in genetic sequencing and their clinical implications.	K-3	quiz
Summarize basic functions of cellular biology and physiology.	K-1	quiz
Explain stem cells and cellular differentiation.	K-1	quiz
Describe the structure and function of excitable tissues, synaptic transmission, and intracellular signaling.	K-1	quiz
Discuss cellular metabolism, its controls, and principles of homeostasis.	K-1	quiz
Describe the clinical effects of disturbances of metabolic pathways.	K-1; K-2	quiz
Discuss cell injury, inflammation and hemostasis.	K-1; K-2	quiz
Identify the cellular and humoral components of immunity.	K-1; K-2	quiz
Explain the fundamental biology of microorganisms and list methods by which these organisms are identified.	K-1; K-2	quiz
List the mechanism of actions of the major classes of antimicrobial agents, and the problem of drug resistance.	K-1; K-4	quiz
Explain the cellular and molecular biology of neoplasia.	K-1; K-2	quiz
Describe the principles underlying current cancer therapies.	K-4	quiz
Identify the parts of the human body via dissection and correlate with prosections, models, and clinical imaging.	K-1	quiz

Analyze, integrate, and apply relevant anatomical and embryological information essential for appropriate patient care.	K-1; K-2	quiz
Build a basic medical interview and perform vital signs.	PC-1	quiz, clinical write-up, faculty/resident rating, OSCE
Demonstrate basic skills in clinical reasoning.	K-1; K-2	quiz, clinical write-up, faculty/resident rating
Explain the basic concepts of medical ethics and professionalism.	P-2; PBLI-3	clinical write-up, faculty/resident rating
Exemplify professional attributes, such as altruism, patient confidentiality, personal responsibility, and accountability to others.	ICS-2; P-1	faculty/resident rating
Adopt a holistic and patient-centered approach to medical care.	ICS-1; ICS-2	faculty/resident rating
Demonstrate a foundation for reflective practice and lifelong learning.	PBLI-1; PBLI-2; PBLI-3; PBLI-4	faculty/resident rating
Analyze, distill, and synthesize clinical and scientific information collaboratively as a team.	ICS-2; PBLI-1	quiz, faculty/resident rating
Discuss social determinants of health, the importance of cultural awareness, and bias.	K-2; K-3; K-4; HCS-1	quiz, faculty/resident rating

Pharmacology

The first week of Essential Principles of Medicine is dedicated to Pharmacology, which is the study of how drugs work. You will learn the fundamental principles governing how drugs affect the body and how the body affects drugs. You will learn to appreciate that drugs also have undesirable affects and you will develop an understanding of the relationship between desired and undesirable effects. Finally, you will develop an appreciation for the necessity of regulation and oversight and be afforded insight into the problems inherent in developing new therapeutics. This unit is designed to provide you with a foundation to understand how to use drugs therapeutically; these principles will be essential as you learn about specific drugs throughout your medical school curriculum and throughout your life as a practicing physician.

Unit Leaders:
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Textbook:
Basic and Clinical Pharmacology, 13th ed., Katzung and Trevor

Schedule

Pharmacology Unit Learning Objectives	**WCM Core Competencies**
Explain the relationship between dose and biological response.	K4
Describe how drugs affect the body, i.e., how they cause their effects (Pharmacodynamics).	K1; K4
Explain how the body handles drugs (Pharmacokinetics; Biotransformation).	K1; K4
List the mechanisms underlying differences between distinct individual's dose-responses to the same drug (both pharmacokinetic and pharmacodynamic).	K4
Explain the relationship between desired and undesirable effects of drugs as a function of dose.	K4
Describe how the administration of multiple drugs can affect each individual drug's effect(s) (i.e., drug interactions).	K-4; PBLI-3
Explain how observational methods provide information about drugs not attainable in clinical trials and why FDA approval is not the end of the process for understanding drug effects humans (i.e., Phase IV).	PBLI-3, 4
Identify when a drug interaction is likely.	K4
Determine an effective and safe dose for a therapeutic drug.	K-4; PBLI-3

Genetics

Information that has become available from genetic and genomic discoveries has the potential to revolutionize the way that physicians and other health care providers evaluate, diagnose and treat their patients. To harness the power of these discoveries, students of medicine need to understand fundamental genetic concepts of DNA biology, the chromosomal basis of inheritance, how genes are regulated, how genes operate and interact with the environment, and the role of genes and chromosomes in both rare and common diseases. The Genetics Module will provide you with a foundation and a context for material covered in later modules of EPOM and will also serve as an introduction to key concepts in clinical medicine, public health and medical research.

Unit Leaders:
Chris Cunniff, MD; cmc9039@med.cornell.edu
Juan Rodriguez-Flores, PhD; jur2014@med.cornell.edu

Textbooks:
Nussbaum, McInnes and Willard, Thompson & Thompson Genetics in Medicine, 8th Ed., Elsevier (available through Clinical Key)

Schedule

Genetics Unit Learning Objectives	WCM Core Competencies
Explain basic DNA biology, such as nuclear DNA structure, meiosis, mitosis, recombination, DNA replication, DNA repair, telomeres, mitochondria.	K1
Outline and describe key aspects of RNA biology, including transcription, translation, splicing, RNA silencing.	K1
Distinguish between different types of mutations such as nonsense, missense, frameshift and splice-site mutations.	K1
Explain the consequences of mutant alleles, including haploinsufficiency, dominant negative and gain of function alleles.	K1
From pedigree examples, recognize basic inheritance patterns, including autosomal dominant and recessive, X-linked dominant and recessive, multifactorial and mitochondrial inheritance.	K1
Describe and recognize examples of basic genetic concepts such as anticipation, genetic heterogeneity, pleiotropy, penetrance and variable expression.	K1
Use Hardy Weinberg principles to calculate allele frequency, heterozygote frequency and the relative proportions of affected and unaffected individuals.	K1
Recognize examples of the following chromosomal abnormalities: aneuploidy, deletion, duplication, inversion and translocation.	K1
Compare and contrast cytogenetic techniques such as chromosome analysis, fluorescence in situ hybridization and chromosome microarray (array comparative genomic hybridization).	K1; K2

Define epigenetics, and distinguish between epigenetic mechanisms such as DNA methylation, histone modification, non-coding RNA, and X-chromosome inactivation.	K1
Describe the process of whole exome and whole genomic sequencing and their clinical applications.	K1; K2
Recognize how ancestry and racial/ethnic identity are relevant to disease.	K1; K3
Distinguish between genetic linkage studies and association studies.	K1; K3
Discuss the increasing usefulness of preconception, prenatal, and neonatal screening.	K1; K3; K4
Analyze how environment and lifestyle leave their mark on the genome.	K1; K2
Recognize that the body is a community of symbiotic organisms, often called the microbiome or metagenome.	K2
Identify risks and benefits to sequencing one's genome.	K3; K4
Explain basic elements of cancer genetics, including proto-oncogenes and tumor suppressor genes	K1
Classify and describe the different technologies currently available for genome editing	K1
Classify and describe the approaches to gene therapy.	K1; K4
Identify and discuss key ethical issues in genetics, including privacy, informed consent, and forensic applications of DNA.	P2
Explain basic evolutionary biology forces that impact human genomes such as mutation, recombination, selection, drift, bottlenecks, admixture and consanguinity.	K1
Provide examples of how evolutionary biology theory is used to predict the functional impact of disease mutations and genes.	K1; K3
Identify the strengths and weaknesses of genome wide association studies, their value in disease gene discovery, and caveats to their interpretation in precision medicine.	K1; K3
Draw a pedigree.	PC1
Take a genetic family history.	PC1
Assess risk for a Mendelian disorder based on genetic data, pedigree and family history.	K3; PC1
Use information from whole exome or whole genome sequencing to classify a variant as benign, pathogenic or of uncertain significance	K3
Identify and use appropriate terminology to refer to individuals with birth defects, developmental disabilities and other problems in vulnerable populations**.**	ICS1; ICS2; P3
Embrace your ignorance and ask good questions.	PBLI4
Although you will be taught thousands of important facts, always remain skeptical, because skepticism is the heart of science.	PBLI1; PBLI2; PBLI3; PBLI4
Explain basic DNA biology, such as nuclear DNA structure, meiosis, mitosis, recombination, DNA replication, DNA repair, telomeres, mitochondria.	K1
Outline and describe key aspects of RNA biology, including transcription, translation, splicing, RNA silencing.	K1

Distinguish between different types of mutations such as nonsense, missense, frameshift and splice-site mutations.	K1
Explain the consequences of mutant alleles, including haploinsufficiency, dominant negative and gain of function alleles.	K1
From pedigree examples, recognize basic inheritance patterns, including autosomal dominant and recessive, X-linked dominant and recessive, multifactorial and mitochondrial inheritance .	K1
Describe and recognize examples of basic genetic concepts such as anticipation, genetic heterogeneity, pleiotropy, penetrance and variable expression.	K1
Use Hardy Weinberg principles to calculate allele frequency, heterozygote frequency and the relative proportions of affected and unaffected individuals.	K1
Recognize examples of the following chromosomal abnormalities: aneuploidy, deletion, duplication, inversion and translocation.	K1
Compare and contrast cytogenetic techniques such as chromosome analysis, fluorescence in situ hybridization and chromosome microarray (array comparative genomic hybridization).	K1; K2
Define epigenetics, and distinguish between epigenetic mechanisms such as DNA methylation, histone modification, non-coding RNA, and X-chromosome inactivation.	K1
Describe the process of whole exome and whole genomic sequencing and their clinical applications.	K1; K2
Recognize how ancestry and racial/ethnic identity are relevant to disease.	K1; K3
Distinguish between genetic linkage studies and association studies.	K1; K3

Cells, Tissues and Control Systems

This four-week unit focuses on the structure and function of cells, how they communicate, and the events that occur in early development. The emphasis will be on basic cell functions. The first two weeks focus on the single cell, in a few cases cells that communicate: the cell as the fundamental unit of living organisms; the transport functions of the cell membrane; the importance of electrolyte and water homeostasis; the communication within and among cells to regulate their function – whether by direct interactions, by electrical signaling, or by chemical communication. The final two weeks move away from the single cell and illustrate how fundamental cell biological processes including cell proliferation, death, shape changes, adhesion, membrane turnover and cell migration are orchestrated to build the early embryo and establish a primitive body plan. Notably, a well-developed body plan forms by 8 weeks of gestation, the period of embryonic development which will be covered. In addition, the diverse cell types generated during embryogenesis will be examined to give you an understanding of how cellular morphology and function are interrelated. The instruction in the unit will be a combination of lectures, large-group discussions, small-group discussions, laboratories and PBL cases. The large- and small-group discussions will expand on the materials presented in the lectures, and you should prepare for each small-group discussion before the session. The histology laboratories introduce you to the basic morphological appearance of cells and tissues, in preparation for Health, Illness and Disease. The PBL cases illustrate how a patient 's clinical problem can lead to new scientific understanding. We will have one patient presentation that will introduce you to the issues of pre-implantation genetic testing and the challenges of implanting a healthy embryo in the uterus.

Unit Leader:
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Textbooks:
A Text and Atlas, 7th ed., Ross, et al. (Required)
Molecular Biology of the Cell, 5th ed., Alberts, et al. (Required)

Schedule

Cells, Tissues, and Control Systems Unit Learning Objectives	**WCM Core Competencies**
Describe the benefits of cellular compartmentalization.	K1
Describe the structure and function of cellular membranes as mosaic structures of lipid bilayers and embedded proteins,	K1
Explain the importance of electroneutrality and osmotic balance.	K1; K2
Explain the driving force for water movement across membranes and the principles underlying the distribution of water among different fluid compartments.	K1-4
Discuss the structure and function of membrane proteins as catalysts of solute movement.	K1; K2
Explain how membrane potential differences are generated, classify and compare mechanisms that produce changes in membrane potentials ¾ including the mechanisms underlying temporal changes in membrane potentials.	K1; K2; K4

Differentiate between transporters and channels, the need for active transport mechanisms, and the regulation of water and ion movement.	K1-4
Give examples of the different types of signals to which cells respond.	K1
List the different classes of receptors, compare their different times of action and persistence, and describe their signaling machinery.	K1; K2
Explain ligand interactions (both signals and drugs) with receptors.	K1; K2; K4
Discuss how spatial and temporal regulation of signaling and signaling cross-talk are important and appreciate how disruptions in signaling may lead to disease.	K1; K2; K4
Distinguish between transmembrane and intracellular receptor signaling.	K1; K2; K4
Summarize the physiological roles of the major intracellular second messengers.	K1; K2; K4
Explain the electrophysiology of nerve action potentials and their role in impulse propagation.	K1
Categorize and compare mechanisms that utilize changes in membrane potential to generate, transmit, and integrate information and action	K1; K2
Classify the major categories of neuronal activity.	K1; K2
Explain the pre- and postsynaptic events underlying synaptic transmission and relate the features that work together to transfer information.	K1; K2
Compare the key differences between information transfer at the neuromuscular junction and in central synapses.	K1; K2
Explain how plastic changes to synaptic transmission contribute to learning and memory.	K1; K2
Discuss the principles governing protein quality control and the mechanisms by which proteins deemed to be defective are eliminated.	K1; K2; K4
Identify cell secretory processes, intracellular transport mechanisms, and receptor-mediated endocytosis.	K1; K2; K4
Explain the organization the cytoskeleton and its importance for cell motility.	K1; K2; K4
Discuss principles underlying cell division and identify key differences between mitosis and meiosis.	K1; K2
Identify blood cells types and explain their functions.	K1; K2; K4
Explain hematopoiesis and the concept of stem cells and identify the stages of development of the erythroid and myeloid lineages.	K1; K2; K4
Discuss the structure and function of the extracellular matrix.	K1; K2; K4
Discuss the structure and function of the adipose tissue..	K1; K2; K4
Describe the organization and histology of epithelial tissues.	K1; K2
Describe the histology of blood and connective tissue.	K1; K2
Describe the cell biological and signaling processes essential for implantation.	K1; K2; K4
Explain why a single signaling molecule can initiate diverse responses in different embryonic cell types.	K1; K2
Define *stem cell*, and categorize the different kinds of stem cells.	K1
Explain why birth defects caused by abnormal development during the earliest stages of embryogenesis are uncommon.	K1-K4

Define the concept of differentiation and identify some common signaling pathways mediating this process.	K1; K2
Identify key principles underlying blastocyst formation, formation of the bilaminar disk, gastrulation, formation of the notochord, and establishment of the body plan.	K1; K2
Describe the major axes of the human body and when they are established during development.	K1; K2
Describe the roles of cell shape changes and epithelial branching morphogenesis in organ formation.	K1; K2
Describe the early development of the central nervous system.	K1; K2; K4
Explain the function, development, and diseases of the placenta.	K1-4
Critically read both classic and contemporary biomedical scientific literature to identify how basic science, clinical, and translational research are conducted and evaluated.	PBL1-4
Investigate and analyze medical cases relevant to the material taught in the Unit.	PBL1-4
Research problems that arise and evaluate the quality of the information that is retrieved; be able to share relevant information with colleagues and other interested parties; apply problem-solving skills.	PBL1-4
Demonstrate enhanced communication and interpersonal skills with colleagues in a small group setting.	ICS1-2
Respect the views, time, and participatory rights of classmates and faculty in small and large group teaching settings.	P1

Metabolism & Nutrition

The Metabolism and Nutrition Unit is presented during Weeks 9-11 of *Essential Principles of Medicine*. In this unit, you will discuss how the body handles carbohydrates, fat, proteins, and nucleic acids to generate and store energy. You will learn about anabolic and catabolic pathways, as well as the variety of chemical interconversions through which, for example, molecules such as glucose are converted into ATP or into a form from which energy can be derived during periods of fasting. The Unit will conclude with a discussion of the serious health consequences when metabolic pathways fail or when their regulation is affected; metabolic dysregulation, which characterizes diseases such as diabetes and obesity, is increasingly relevant to an understanding of cancer.

Unit Leaders:
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Textbooks:
Biochemistry: Lippincott's Illustrated Review Series, 6th ed., Harvey and Ferrier (Required)
Lehninger's Principles of Biochemistry, 6th ed., Nelson and Cox (Recommended)

Schedule

Metabolism & Nutrition Unit Learning Objectives	**WCM Core Competencies**
Discuss the overall concept of cellular metabolism – anabolic and catabolic pathways, energy storage and release, production of building blocks for macromolecule synthesis.	K1
Differentiate how various organs control metabolism.	K1
Discuss the basics of enzymes, transporters, signal transduction, and mitochondrial structure.	K1
Explain glucose homeostasis (pathways and hormonal regulation).	K1; K2
Identify the steps of glycolysis and gluconeogenesis and the synthesis and breakdown of glycogen.	K1; K2
Discuss Krebs cycle, electron transport, and the pentose phosphate pathway.	K1; K2
Analyze the role of fat in energy production, membrane synthesis, and production of bioactive molecules.	K1
Describe the structure, biosynthesis, oxidation and storage of fatty acids.	K1
Describe the diversion of fatty acids into ketone body production in the liver under conditions of fasting/starvation or diabetes.	K1; K2
Discuss membrane lipid synthesis and lysosomal storage diseases.	K1; K2
Describe the basic metabolic pathways of cholesterol and lipoproteins.	K1; K2
Explain the formation and metabolism of the lipoproteins.	K1
Discuss role of excess lipoproteins in atherosclerosis.	K1; K2
Describe reverse cholesterol transport by HDLs.	K1
Describe common pathways of amino acid catabolism to release ammonia (handled by the urea cycle) and carbon skeletons.	K1

Differentiate between ketogenic and glucogenic amino acids, and diseases resulting from defective catabolism (phenylketonuria, maple syrup urine disease) and biosynthesis of non-essential amino acids.	K1; K2
Explain nucleotide biosynthetic pathways.	K1
Describe diseases associated with defective nucleotide biosynthesis and therapies that utilize the biosynthetic pathways.	K1; K2
Define the mechanism of allopurinol action.	K1; K2
Describe the biosynthesis and regulation of heme production; human porphyrias; degradation of heme to bilirubin, biliverdin and derivatives; various forms of jaundice and biomedical consequences of heme degradation defects; mechanisms of cell uptake and trafficking of dietary iron for support of heme biosynthesis.	K1; K2
Explain the essential roles of metals in physiology.	K1
Discuss the potential danger of "oxidative stress" imposed by free transition metals in cells.	K1
Illustrate how biological systems have adapted protective mechanisms for safe use of metals.	K1
Compare the physiological trafficking of dietary iron, copper, and zinc and the diseases and conditions resulting from their insufficiency or excess.	K1; K2
Summarize changes in metabolism in the fed vs. fasted state.	K1; K2
Describe metabolic changes that accompany insulin resistance.	K1; K2
Correlate cellular biochemical pathways with the changes in cancer cell metabolism.	K1; K2
Describe the basic medical evaluation of an individual with obesity.	K1; K2
Evaluate laboratory data on metabolites.	K1; K2
Diagram metabolic pathways.	K1
Respect the views, time, and participatory rights of classmates and faculty in small and large group teaching settings.	P1

Injury, Infection, Immunity & Repair

The Injury, Infection, Immunity, and Repair learning unit introduces the principles of general pathology, immunology, and microbiology so that students can appreciate the individual disciplines, yet also see how they are integrated within the context of disease. In this regard, the weekly PBL case introduces the theme of the week, which includes topics from the three core basic science disciplines. These topics are then developed and expanded upon by each discipline in lectures, labs, and small-group discussions. In addition to the core disciplines, the study of pharmacology continues with an introduction to antibiotic, antiviral, and antifungal drug classes. Finally, the specific pharmacology of several prototype drug classes are presented in relation to the PBL exercises.

Unit Leader:
Domenick J. Falcone, PhD; dfalcone@med.cornell.edu

Required Textbooks:
Abbas, A., Lichtman, A., Pillai, S.: Basic Immunology: Functions and Disorders of the Immune System, 4th Ed (available online)
Katzung, B., Trevor, A.: Basic & Clinical Pharmacology, 13th Ed (available online)
Kumar, V., Abbas, A. & Aster, J.: Pathologic Basis of Disease, 9th Ed (available online)
Levinson, W.: Review of Medical Microbiology and Immunology, 13th Ed (available online)

Schedule

Injury, Infection, Immunity & Repair Unit Learning Objectives	**WCM Core Competencies**
Discuss the basic cellular reactions to injurious stimuli and identify reversibly and irreversibly injured cells.	KI; K2
Explain the mechanisms underlying acute and chronic inflammation, hypersensitivity reactions, hemostasis and thrombosis.	K1; K2
List the specific morphologic characteristics of acute and chronic inflammation, hypersensitivity reactions, and venous and arterial thrombi.	K1; K2
Identify the cellular and humoral components of the immune system.	K1; K2
Describe the effector and regulatory mechanisms underlying the innate and adaptive immune responses to bacterial and viral pathogens, transplanted organs and self-antigens (i.e., autoimmunity).	K1; K2
Explain the procedures and principles by which microorganisms are isolated and classified.	K1; K2
Describe bacterial physiology, including structure and properties of the cytoplasm, plasma membrane, and cell wall, as well as functions of pili and flagella, and oxygen and nutritional requirements.	K1; K2
Define *normal* flora and discuss its clinical importance.	K1; K2
Discuss bacterial gene structure, replication, and transcription.	K1; K2
Describe bacteremia, sepsis and septic shock.	K1; K2
Explain the principles by which viruses are classified and discuss virus-host interactions.	K1; K2
Identify general characteristics of fungi and molds and list clinical conditions associated with fungal infections.	K1; K2

Explain the mechanisms of action of the major classes of antibiotic, anti-viral and anti-fungal drugs and the problem of drug resistance.	K4
Search, retrieve, and critically analyze medical information from various evidence-based sources to be able to explain how basic science, clinical, and translational research are conducted and evaluated.	PBLI1–4
Analyze, distill, and synthesize clinical and scientific information collaboratively as a team – from generating a hypothesis about a medical problem, exploring this problem, and reaching a reasoned conclusion.	PBLI1–4
Search various electronic and other databases and resources for evidence-based studies and critically evaluate their usefulness as applied to patient care.	PBLI1–4
Demonstrate enhanced communication and interpersonal skills with colleagues in a small group setting.	ICS1&2
Respect the views, time, and participatory rights of classmates and faculty in small and large group teaching settings.	P1

Neoplasia

The last week of the course deals with Neoplasia, a topic that includes benign tumors, pre-malignant lesions, and malignant cancers. You will learn how genetic and environmental factors contribute to cancer risk, how tumor growth is initiated, and how tumor cells gain characteristics that allow progression to malignancy. Current models of the biology underlying metastasis and the role of stem cells in tumorigenesis will be discussed. Major principles underlying conventional and more novel cancer therapies will be presented, including chemotherapy, radiotherapy and immunotherapy, together with the promise and challenges of "precision cancer medicine." The unit will conclude with discussion of the potential for improved control of cancer in future.

Cancer is chosen as the final topic in this course for two reasons: first, because of its paramount importance as a cause of mortality; and second, because it exemplifies a disease whose understanding and treatment requires knowledge of a broad range of disciplines. These include genetics, genomics, cell and tissue biology, metabolism, inflammation, biochemistry, and pharmacology. Hence, the subject draws upon all the previous learning units of this segment and re-emphasizes their relevance in the battle against disease.

Unit Leader:
Anthony Brown, PhD; amcbrown@med.cornell.edu

Textbooks:
Molecular Biology of the Cell, 5th ed., Alberts, et al. (Required)
The Biology of Cancer, R.A. Weinberg (Recommended)

Schedule

Neoplasia Unit Learning Objectives	**WMC Core Competencies**
Distinguish between benign neoplasia and malignant cancer.	K2
Identify the multiple factors that contribute to cancer risk.	K2; K3
List the principal acquired characteristics of cancer cells.	K1; K2
Evaluate the mutation-selection model of tumorigenesis.	K1; K2
Distinguish conceptual differences between oncogenes and tumor suppressor genes.	K1; K2
Relate mutational changes to deregulation of cell cycle control.	K1; K2
Describe the principles underlying current cancer treatments: chemotherapy, radiotherapy, immunotherapy, and "targeted" therapy.	K4
Explain the importance of predicting risk of metastasis in making treatment decisions.	K2; K4
Discuss current models underlying the biology of tumor metastasis, including limitations of the mutation-selection model, evidence for epithelial-mesenchymal transition, and the contributing role of stromal cells in tumor progression.	K2
Evaluate the role of cancer stem cells in primary tumors, their metastases, and their potential as therapeutic targets.	K1; K2

Recognize the applications of genomic analysis to cancer diagnosis, prognosis, and treatment, and the therapeutic challenges caused by tumor evolution.	K1; K2
Identify strategies for preventing cancer mortality by risk reduction and early detection.	K2; K3
Using histology, distinguish benign neoplasia from malignant cancer.	K2;
Appreciate the emotional impact of cancer on patients and their families.	ICS1
Recognize both the potential and the challenges of implementing radically improved cancer treatments in the future.	K3; HCS1

Anatomy

The Gross Anatomy unit of the *Essential Principles of Medicine* is scheduled for 1 or 2 afternoon sessions per week throughout the first semester of the medical curriculum. It is organized around a regional approach to anatomy, but time is also spent throughout the course to review information from a systemic standpoint. The regional approach is divided into the following three sections: Back, Shoulder Region, Upper Extremity, Thorax, Abdomen, Pelvis, Perineum, Lower Extremity and Head and Neck.

The Unit is conducted by laboratory introductions and lectures and full body dissection. Body imaging using MRI's, CT's and Plain radiographs, are also an integral part of the course.

Clinical faculty are involved in teaching during the dissection laboratory sessions, thus emphasizing the clinical correlations pertinent to the area of dissection.

At the end of this course, students will be able to analyze, integrate and apply relevant anatomical and embryological information pertaining to the clinical settings essential for appropriate patient care.

Unit Leader:
Estomih Mtui, MD; epmtui@med.cornell.edu

Textbooks:
K. Moore, A. Agur, & A. Dalley, *Essential Clinical Anatomy*, 5th ed., Wolters Kluwer/Lippincott Williams & Wilkins (Required)

F.H. Netter, *Atlas of Human Anatomy*, 6th ed., Elsevier Saunders (Required)

Schedule

Anatomy Unit Learning Objectives	**WCM Core Competencies**
Identify the various body parts and organ systems utilizing radiological imaging techniques, including X-ray, CT-scan, and MRI.	K1
Describe the normal and abnormal imaging findings using X-rays, CT's and MRI's.	K1
Discuss the anatomy of various body parts through use of dissections, various available models, prosections, and plastinated materials in the anatomy laboratory.	K1
Describe the various clinical conditions associated with the identified anatomical structures, organs, and organ systems	K1; K2
Discuss the morphological developmental anatomical perspectives and their associated abnormal developmental syndromes.	K1; K2
Analyze, integrate, and apply relevant anatomical and embryological information essential for appropriate patient care.	K1; K2
Identify the bony landmarks and dissect the various soft tissue structures of the human body, including the back, spinal cord, shoulder region, upper extremities, thorax, abdomen, perineum/pelvis, lower extremities, and head and neck.	K1

Perform high quality dissections including craniotomies and laminectomies	K1
Respect the views, time, and participatory rights of classmates and faculty in small and large group teaching settings.	P1

Patient Care and Physicianship

The overarching goal of the PC/P unit is to help you develop fundamental knowledge, skills and attitudes related to the care of patients and the role of the physician. Specifically, you will learn the basics of clinical evaluation, the doctor-patient relationship, biopsychosocial diversity, reflective practice, and related topics. The PC/P unit is integrated with the EPOM science units and with more advanced skills in future semesters.

Unit Leaders:
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Textbooks:
J. Coulehan & M. Block, *The Medical Interview: Mastering Skills for Clinical Practice*, 5th ed. F.A. Davis Co. (Required)
L. Bickley, *Bates' Guide to Physical Examination and History-Taking*, 11th ed., Wolters Kluwer (Required)
R. LeBlond, D. Brown, & M. Suneja, *DeGowin's Diagnostic Examination*, 10th ed., McGraw Hill Medical (Recommended)
J. Orient, *Sapira's Art and Science of Bedside Diagnosis*, 4th ed., Wolters Kluwer Health/Lippincott, Williams, Wilkins (Recommended)

Schedule

Patient Care and Physicianship Unit Learning Objectives	**WCM Core Competencies**
Describe the elements of the complete history.	PC1
Discuss the role of the medical interview and physical examination in clinical diagnosis.	PC1; PC2
Review the ethical responsibilities of physicians.	P2
Explain the biopsychosocial model, the importance of personal and cultural diversity, and the impact of privilege, bias and discrimination in healthcare.	P3; HCS1
Identify ones own needs for wellness and self-care.	P1
Perform the main elements of the medical interview.	PC2
Demonstrate how to take vital signs.	PC1; PC2
Describe basic approaches to diagnostic reasoning.	K1; K2
Respect the views and rights of students and faculty in small and large group settings.	P1
Appreciate the emotional impact of cancer on patients and their families	ICS1
Exemplify professional attributes, such as altruism, patient confidentiality, personal responsibility, and accountability to others, while beginning the transition to becoming a physician.	ICS2
Adopt a holistic and patient-centered approach to medical care.	ICS1; ICS2
Demonstrate a foundation for lifelong learning.	PBL1; PBL2; PBL3; PBL4
Reflect on the experiences of the student, the patient and the physician.	P1