

MTEC 101: Medical Science Course 1

Patient Care and Clinical Skills: Students must be able to provide care that is compassionate, appropriate, and effective for treating health problems and promoting health							
					Assessment Method	Learning Objective	Teaching Methods
	POM	IMM	HEM	CAR			
PC4. Justify each diagnostic test ordered and proposed with regard to cost, effectiveness, risks and complications, and the patient's overall goals and values.			X	X	<ul style="list-style-type: none"> ✓ M-C Exams (summative) ✓ Quizzes (formative) 	<p>HEM: Identify the risks and benefits of bone marrow biopsies and stem cell transplant, along with the costs associated with biologic therapies.</p> <p>CAR: Discuss the basic scientific principles of cardiac imaging, including cardiac radiography, echocardiography, cardiac catheterization, and nuclear imaging, and be able to give examples of how these tests should be used appropriately in patient care. Describe the scientific principles underlying electrocardiography and correctly interpret normal and abnormal ECG findings.</p>	<ul style="list-style-type: none"> ✓ Large Group Lecture ✓ Small Group ✓ Computer-based Modules
PC7. Identify and incorporate into the care of patient's appropriate prevention strategies for common conditions.		X	X		<ul style="list-style-type: none"> ✓ M-C Exams (summative) ✓ Self-Directed Learning Cases (formative) 	<p>IMM: Describe the use of prevention strategies including immunization, use of antimicrobial agents, administration of immunoglobulin products, and use of immunomodulators and immunosuppressants in the management of disorders of immune dysregulation / immunodeficiency.</p> <p>HEM: Develop a medical management when dealing with patients with myeloproliferative and myelodysplastic syndromes.</p>	<ul style="list-style-type: none"> ✓ Large Group Lecture ✓ Self-Directed Learning ✓ Small Group
PC8. Identify when patients have life-threatening conditions and institute appropriate initial therapy			X		<ul style="list-style-type: none"> ✓ M-C Exams (summative) 	<p>HEM: Understand the hematologic and oncologic emergencies, including tumor lysis syndrome, cord compression, severe anemia, and neutropenic fever.</p>	<ul style="list-style-type: none"> ✓ Large Group ✓ Lecture ✓ Small Group

Medical Knowledge: Students must demonstrate knowledge about established and evolving biomedical, clinical, and cognate (e.g., epidemiological and social-behavioral) sciences and the application of this knowledge in patient care, specifically:

	P O M	I M M	H E M	C A R	Assessment Method	Learning Objective	Teaching Methods
MK1. Describe the normal structure and function of the human body and of each of its major organ systems across the life span.	X	X	X	X	<ul style="list-style-type: none"> ✓ M-C Exams (summative) ✓ Take-home Quiz (formative) ✓ Quiz (formative) 	<p>POM: Explain the basic concepts of gene expression including DNA structure and function, transcription, translation, and post-translational processing. Summarize the basic principles of PCR and DNA sequencing methods. Summarize the key features of energy metabolism. Illustrate key features of cell cycle, cell cycle regulation, and mechanisms of dysregulation. Identify important aspects of cell structure including cytoskeleton, organelles, glycolipids, gap junctions, extracellular matrix, and receptors. Identify key histologic features of epithelial, connective, and nerve tissue. Construct and interpret genetic pedigrees. Identify different modes of inheritance including autosomal dominant, autosomal recessive, X-linked and mitochondrial. Explain genetics mechanisms including penetrance and genetic heterogeneity. Demonstrate an understanding of the principles of gene therapy and genetic testing and counseling. Discuss the challenge of interpreting large scale genomic analysis. Identify key aspects of signal transduction, including structure and function of receptors and ligands.</p> <p>IMM: Describe the normal structure, production, and function of the hematopoietic/lymphopoietic system, including bone marrow, thymus, spleen, and lymph nodes, specifically, structure and function of lymph nodes, host defense mechanisms (acute and chronic inflammation), host barriers to infection, mucosal immunity and immunogenetics/immunopathology. Describe the normal structure, production, and function of the following cells and cellular components: granulocytes, natural killer cells, macrophages, mast cells, dendritic cells, cell receptors; T lymphocytes, including T-lymphocyte receptors, accessory molecules, cell activation and proliferation, cytotoxic T lymphocytes, and memory T lymphocytes; B lymphocytes and plasma cells, including B-lymphocyte receptors, immunoglobulins, cell activation and proliferation, including development of antibodies and memory B lymphocytes. Demonstrate knowledge of the cellular basis of the</p>	<ul style="list-style-type: none"> ✓ Large Group Lecture ✓ Small Group ✓ Self-Directed Learning ✓ Computer-based modules ✓ Gross Anatomy Dissection Labs ✓ Optional Path Specimen Labs

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					<p>immune response and immunologic mediators; antigen processing and presentation in the context of MHC I and MHC II molecules, including distribution of MHC I and MHC II on different cells; mechanism of MHC I and MHC II deficiencies, and the genetics of MHC; regulation of the adaptive immune response; activation, function, and molecular biology of Complement; function and molecular biology of cytokines; basis of immunologic diagnosis.</p> <p>HEM: Describe the normal structure and function of the hematopoietic system, including bone marrow, spleen, and lymph nodes.</p> <p>CAR: Describe the normal structure and function of the autonomic nervous system, outlining how anatomy, cell biology and physiology work together. Describe the normal events occurring during the embryonic period of gestation. Describe the normal embryology, structure and function of the cardiovascular system, outlining how anatomy, cell biology and physiology work together.</p>	
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<p>MK2. Explain various causes (genetic, developmental, metabolic, toxic, microbiologic, autoimmune, neoplastic, degenerative, behavioral, and traumatic) of major diseases and conditions and the ways in which they operate on the body (pathogenesis).</p>	X	X	X	X	<ul style="list-style-type: none"> ✓ Self-Assessment (formative) ✓ M-C Exams (summative) ✓ Quiz (formative) 	<p>POM: Relate the structure and function of proteins and enzymes to disease. Describe some of the reproductive and phenotypic risks associated with chromosome abnormalities. Describe the types of chromosome abnormalities that are routinely detected using both traditional and molecular cytogenetic techniques.</p> <p>Explain and contrast the strengths and weaknesses of the three technologies used to identify chromosome abnormalities in clinical cytogenetic laboratories. Describe the application of molecular genetic testing for cystic fibrosis and hereditary breast/ovarian cancer syndrome. Illustrate basic concepts of microbial identification and classification, including principles, microorganism identification, and non-immunologic laboratory analysis. Identify and explain differences among bacteria, viruses, fungi, parasites, and prions by becoming proficient in the microbiology laboratory setting.</p> <p>IMM: Explain how the functions of the immune system are impacted by the processes of fetal development, ageing, altered immunity due to infection with select pathogens (HIV, measles, EBV, et al.), and altered ability to recognize self in autoimmune disease processes. Know that many primary immune deficiencies are due to acquired or spontaneous gene mutations.</p> <p>HEM: Describe the various causes of lymphomas and plasma cell dyscrasias. Describe the general principles of oncology and cancer biology, general principles of radiology and the general principles of radiation oncology related to cancer.</p> <p>Describe the biochemical principles of oxygen binding to heme in hemoglobin, allosterism of 2,3-DPG binding to hemoglobin and cooperativity of oxygen binding to hemoglobin.</p> <p>CAR: Describe the normal events occurring during the embryonic period of gestation. Describe the causes of cardiovascular disease, including genetic, congenital, metabolic, microbiologic, degenerative and behavioral, and explain how they manifest in organ system dysfunction.</p>	<ul style="list-style-type: none"> ✓ Large Group Lecture ✓ Interactive Large Group Lecture ✓ Small Group Labs ✓ Computer-based modules ✓ Optional Path Specimen Labs
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<p>MK3. Describe how the altered structure and function (pathology and pathophysiology) of the body and its major organ systems are manifest through major diseases and conditions.</p>	X	X	X	X	<ul style="list-style-type: none"> ✓ M-C Exams (summative) ✓ Quiz (formative) 	<p>POM: Compare and contrast necrosis and apoptosis at the cellular and tissue level. Give examples of acute inflammatory and chronic inflammatory responses as well as reparative processes.</p> <p>IMM: Describe how alterations in the organs (bone marrow, spleen, thymus, and lymphoid tissues), cells and molecules of the immune system can impact immune function leading to multiple disease states.</p> <p>HEM: Differentiate the principles of microbiology especially related to parasitic infections, fungal pathogens, herpesviruses, and viral latency and cancer. Describe the pathology and pathophysiology of acute and chronic leukemias. Differentiate between the different leukemias and lymphomas.</p> <p>CAR: Describe the pathology and pathophysiology underlying the clinical manifestations of common cardiovascular conditions, including the following: atherosclerosis, ischemic disease and acute coronary syndromes, valvular heart disease, congenital heart disease, heart failure, cardiomyopathy, cardiac arrhythmias, diseases of the pericardium, and diseases of the aorta and peripheral vasculature.</p>	<ul style="list-style-type: none"> ✓ Lab ✓ Large Group Lecture ✓ Small Group ✓ Computer-based Modules ✓ Optional Path Specimen Labs
<p>MK4. Identify the proximate and ultimate factors that contribute to the development of disease and illness, and that contribute to health status within and across populations regionally, nationally, and globally.</p>	X	X	X	X		<p>All Blocks: Identify the role clinical epidemiology plays in studying the determinants and effects of clinical decisions. Understand how epidemiology analyzes the distribution and causes of disease in populations.</p> <p>IMM: Explain how factors such as malnutrition, ageing, use of vaccines, and general health status affect the function of the immune system and impact health status of populations.</p>	<ul style="list-style-type: none"> ✓ Clin Epi TBL ✓ Clin Epi Small Group ✓ Clin Epi Computer-Based Modules ✓ Large Group Lecture

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<p>MK5. Demonstrate knowledge of the common medical conditions within each clinical discipline, including its pathophysiology and fundamentals of treatment.</p>		X	X	X	<p>✓ M-C Exams (summative)</p>	<p>IMM: Learn the spectrum of disease processes caused by altered immunity including primary and acquired immune deficiencies (latter including HIV / AIDS), hypersensitivity reactions, autoimmune states, disorders of lymphatic drainage, and transplantation. Know the pathophysiology of the immune defect in these disorders / processes and fundamentals of management of the immune defect and prevention of infection. Recognize the signs and symptoms of the spectrum of disease processes caused by altered immunity including primary and acquired immune deficiencies (latter including HIV / AIDS), hypersensitivity reactions, autoimmune states, disorders of lymphatic drainage, and transplantation. Know the standard approaches to diagnosis of these conditions and the fundamentals of management of the immune defect and prevention of associated infection.</p> <p>HEM: Identify types of anemia with an emphasis on iron deficiency, vitamin B12/folate deficiency, aplastic anemia, hemolytic anemias, sickle cell disease, and the thalassemias. Describe the pathophysiology of hemostasis and thrombosis, including normal hemostasis, and disorders that lead to either hemorrhage or thrombosis, and disorders of platelet number and function. Recognize signs and symptoms of anemia, thrombocytopenia, bleeding disorders, blood clots, leukemias, lymphomas, and myeloma in order to identify therapies for these disorders.</p> <p>CAR: Identify the basic principles of behavior change related to nutrition and cardiovascular risk. Describe how common laboratory tests, including cardiac biomarkers, are used in the diagnosis and treatment monitoring of cardiovascular disease.</p>	<p>✓ Large Group Lecture</p> <p>✓ Small Group</p>
<p>MK7. Recognize the medical consequences of common societal problems</p>				X		<p>CAR: Discuss the impact of nutrition on the cardiovascular system</p>	<p>✓ Large Group Lecture</p>

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Interpersonal and Communication Skills: Students must demonstrate interpersonal and communication skills that facilitate effective interactions with patients and their families and other health professionals.							
					Assessment Method	Learning Objective	Teaching Method
	POM	IMM	HEM	CAR			
IC2. Communicate effectively in oral format with colleagues, and other health care professionals.	X	X	X	X	✓ Peer Evaluation (formative) ✓ Mid-Course Feedback (formative)	All Blocks: Communicate in a clear, accurate, and respectful manner with small group facilitators and peers.	✓ Small Group ✓ Self-Directed Learning Simulation ✓ Labs

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Professionalism: Students must demonstrate a commitment to professional service, adherence to ethical principles, sensitivity to patients, and maintain personal health and well-being.

					Assessment Method	Learning Objective	Teaching Method
	POM	IMM	HEM	CAR			
PR1. Identify and consistently demonstrate ethical principles and behaviors in the care of patients	X	X	X	X	<ul style="list-style-type: none"> ✓ Peer Evaluation (formative) ✓ Mid-Course Feedback (formative) 	<p>All Blocks: Treat everyone including patients, families, team members, faculty, peers, and staff with unconditional positive regard during every interaction and recognize the importance of patient centered delivery of healthcare. Demonstrate ethical behaviors in the preclinical setting that are required in the clinical setting, including but not limited to respect, honesty, and humility.</p>	<ul style="list-style-type: none"> ✓ Large Group Lecture ✓ Small Group ✓ Simulation Labs
PR2. Demonstrate professional behavior consistent with expectations for the medical profession including punctuality and attire	X	X	X	X	<ul style="list-style-type: none"> ✓ Peer Evaluation (formative) ✓ Mid-Course Feedback (formative) 	<p>All Blocks: Arrive on time each day and actively prepare for and participate in patient care and teaching activities. Ask for and incorporate feedback regularly to improve performance. Demonstrate honest behavior during exams and post-exam reviews. Fulfill professional obligations when absent by seeking an administrative excuse only when necessary and in advance, communicating absence to appropriate individuals, and making up missed work.</p>	<ul style="list-style-type: none"> ✓ Large Group Lecture ✓ Small Group ✓ Simulation Labs

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Life Long Learning: Students must be able to investigate and evaluate their patient care practices, appraise and assimilate scientific evidence, and improve their practice of medicine.

					Assessment Method	Learning Objective	Teaching Method
	POM	IMM	HEM	CAR			
LL1. Demonstrate skills in retrieving, critically assessing, and integrating social and biomedical information into clinical decision-making.	X	X	X	X	<ul style="list-style-type: none"> ✓ Self-Directed Learning Cases (formative) 	<p>All Blocks: Develop the ability to refine clinical questions. Identify, analyze, and synthesize information relevant to individual learning needs. Assess the credibility of information sources. Share information with peers, professors, and small group facilitators. Integrate knowledge into clinical decision-making.</p>	<ul style="list-style-type: none"> ✓ Self-Directed Learning ✓ Small Group
LL2. Reflect upon clinical, service and educational experiences, evaluate positive and negative aspects, and make changes to improve future experiences	X	X	X	X	<ul style="list-style-type: none"> ✓ Self-Directed Learning Cases (formative) ✓ Peer Evaluation (formative) ✓ Mid-Course Feedback (formative) 	<p>All Blocks: Identify gaps in knowledge, clinical skills, and professional behaviors. Apply feedback on information-seeking skills. Apply feedback delivered in peer evaluations and mid-course evaluations to improve professional and educational performance.</p>	<ul style="list-style-type: none"> ✓ Self-Directed Learning ✓ Small Group
LL3. Demonstrate personal accountability by actively seeking feedback, admitting errors openly, and honestly modifying behavior.	X	X	X	X	<ul style="list-style-type: none"> ✓ Self-Directed Learning Cases (formative) ✓ Peer Evaluation (formative) ✓ Mid-Course Feedback (formative) 	<p>All Blocks: Demonstrate ability to disclose and be accountable for mistakes. Demonstrate openness to constructive feedback.</p>	<ul style="list-style-type: none"> ✓ Self-Directed Learning ✓ Small Group

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Social & Health Systems Science: Students must demonstrate an awareness of and responsiveness to the larger system of health care and demonstrate the skills needed to improve the health of specific clinical populations							
					Assessment Methods	Learning Objectives	Teaching Method
	POM	IMM	HEM	CAR			
SHS4. Identify factors that place populations at risk for disease or injury and select appropriate strategies for risk reduction.		X		X	✓ M-C Exams (summative) ✓ Quiz (formative)	IMM: Identify factors including malnutrition, ageing, lack of appropriate immunizations, and presence of primary or acquired immune deficiency that place populations at increased risk of sequelae of altered immunity. Know the means to correct or modify these risks to improve immune function. CAR: Discuss the behaviors that contribute to cardiovascular disease.	✓ Large Group Lecture ✓ Small Group
SHS7. Demonstrate collaborative teamwork skills and the ability to work effectively with other members of the health care team.	X	X	X	X	✓ Self-Directed Learning Cases (formative) ✓ Peer Evaluation (formative) ✓ Mid-Course Feedback (formative)	All Blocks: Work collaboratively as a member of a team to learn basic science and organ-based content and to solve clinical problems.	✓ Small Group ✓ Lab Simulation ✓ Self-Directed Learning
SHS10. Demonstrate an ability to integrate group level clinical data (registries) into the care of patient and populations.	X	X	X	X	✓ Clin Epi Quizzes	All Blocks: Describe the various tools of clinical epidemiology utilized in making predictions about individual patients.	✓ Clin Epi TBL ✓ Clin Epi Small Group ✓ Clin Epi Computer-Based Modules

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