

DATE	TOPIC	OBJECTIVES	INSTRUCTOR
<b>Aug 29</b> Lecture 1	Introduction	<ul style="list-style-type: none"> <li>• Understand course requirement</li> <li>• Meet the team</li> <li>• Process of review session and exam preparation</li> <li>• Introduction to the world of microbes and immune cells</li> </ul>	Dr. Laouar
<b>Aug 31</b> Lecture 2	Generation of the Immune System	<ul style="list-style-type: none"> <li>• Describe components of the immune system including cells and organs</li> <li>• Introduce the concept of stem cell research</li> <li>• Properties of hematopoietic stem cell (HSC)</li> <li>• Describe the process of Hematopoiesis</li> <li>• Describe lymphoid and myeloid progenitors</li> <li>• Provide examples of diseases treated with HSC therapy</li> </ul>	Dr. Laouar
<b>Sep 5</b> Lecture 3	Innate defense	<ul style="list-style-type: none"> <li>• Describe the 1st line of defense: <ul style="list-style-type: none"> <li>- Anatomic barriers</li> <li>- Physiologic barriers</li> <li>- Chemical barriers</li> <li>- Microflora barriers</li> <li>- Inflammatory barriers</li> </ul> </li> <li>• Introduce the 2<sup>nd</sup> line of defense: <ul style="list-style-type: none"> <li>- Properties of Macrophages</li> <li>- Properties of Granulocytes</li> <li>- Properties of Natural Killer cells</li> <li>- Properties of Dendritic cells</li> </ul> </li> </ul>	Dr. Laouar
<b>Sep 7</b> Lecture 4	Mechanisms and consequence of sensing Pathogens	<ul style="list-style-type: none"> <li>• Explain the principal of Pathogen Associated Microbial Pattern (PAMP) recognition</li> <li>• Study of some examples of Toll-like Receptor (TLR), Nod-like Receptor</li> <li>• Introduce the concept of cytokine network</li> <li>• Define what is a cytokine and a cytokine receptor</li> <li>• Provide some examples to study the secretion, action, and roles of cytokine</li> <li>• Nomenclature of cytokines</li> <li>• Describe the principal of cytokine storm</li> </ul>	Dr. Laouar
<b>Sep 12</b> Lecture 5	T cells and Antigen presentation	<ul style="list-style-type: none"> <li>• Explain the functions and attributes of the adaptive immune system</li> <li>• Describe properties of T lymphocytes <ul style="list-style-type: none"> <li>- Structure of TCR</li> <li>- Structure of TCR/CD3 Complex</li> <li>- Structure of MHC Co-receptors</li> <li>- Antigen Peptide Processing</li> </ul> </li> <li>• Explain the process of antigen presentation <ul style="list-style-type: none"> <li>- Structure of MHC molecules</li> <li>- Antigen Peptide Processing</li> <li>- MHC class I presentation</li> <li>- MHC class II presentation</li> </ul> </li> <li>• Overview of CD4 and CD8 T cell responses</li> <li>• Explain difference between antigens and super-antigens</li> </ul>	Dr. Laouar
<b>Sep 14</b> Lecture 6		<ul style="list-style-type: none"> <li>• Describes the steps of T cell development in the thymus including:</li> </ul>	Dr. Laouar

	T cell development	<ul style="list-style-type: none"> <li>- Pre-T cell migration from the Bone Marrow to the Thymus</li> <li>- Expression of CD4 and CD8 during T cell development</li> <li>- Localization of developing T cells in the thymus based on their stage of development</li> <li>- Rearrangement of TCR ab chains by VDJ recombination</li> <li>- Positive and Negative selection events</li> <li>- Establishment of MHC restriction</li> <li>- Role of AIRE in the negative selection process</li> </ul>	
<b>Sep 19</b> Lecture 7	Requirement & Consequences of T cell Activation	<ul style="list-style-type: none"> <li>• Define signal 1 and 2</li> <li>• Explain the process of T cell anergy</li> <li>• Describe elements of the immunological synapse</li> <li>• Describe the process of T cell clonal expansion</li> <li>• Describe the process of T cell memory</li> </ul>	Dr. Laouar
<b>Sep 21</b> Lecture 8	B cells and antibodies -I	<ul style="list-style-type: none"> <li>• Define humoral immunity</li> <li>• Describe the structure, class, and form of antibodies</li> <li>• Explain the difference between secretory and membrane-bound antibodies</li> <li>• Describe the process of VDJ recombination</li> <li>• Explain the process of B cell development</li> <li>• Explain how B cells are activated</li> <li>• Discuss the importance of Plasma B cells and memory B cells</li> </ul>	Dr. Laouar
<b>Sep 26</b> Lecture 9	B cells and antibodies -II	<ul style="list-style-type: none"> <li>• Describe the role of Immunoglobulins <ul style="list-style-type: none"> <li>- Immobilization</li> <li>- Agglutination/Precipitation</li> <li>- Neutralization</li> <li>- Opsonization</li> </ul> </li> <li>• Explain the process of Ig Class switching</li> <li>• Explain how memory B cells form</li> <li>• Provide comparison between T and B cells</li> <li>• Provide comparison between antibodies and TCR</li> </ul>	Dr. Laouar
<b>Sep 28</b> Lecture 10	Vaccination & Immunotherapy	<ul style="list-style-type: none"> <li>• Describe syndromes of immunodeficiency</li> <li>• Describe disorders of autoimmunity</li> <li>• Describe disorders of autoimmunity <ul style="list-style-type: none"> <li>- Describe the principal of CAR Therapy</li> <li>- Cytokine therapy (IL-15)</li> <li>- Inhibitor of TGFb pathway</li> </ul> </li> <li>• Describe the principal of Vaccination</li> </ul>	Dr. Laouar
<b>Sep 29</b> Pre-exam discussion	<u>Optional</u> Virtual mode	6-7pm	Dr. Laouar
<b>Oct 2</b> <u>Exam</u> <u>Unit 1</u>	Virtual mode	<ul style="list-style-type: none"> <li>• Open book exam</li> <li>• 50 questions</li> <li>• 2 hours</li> </ul>	Dr. Laouar
		<b>End of the Immunology Module</b>	
<b>OCT 3</b> Lecture 1	Introduction to Viruses	<ul style="list-style-type: none"> <li>• Virus structure</li> <li>• Viral genomes</li> <li>• How do we study and assay viruses</li> </ul>	Dr. Imperiale

		<ul style="list-style-type: none"> <li>• Viral disease burden</li> <li>• Outcomes of infection</li> </ul>	
<b>OCT 5</b> Lecture 2	Principles of Replication I	<ul style="list-style-type: none"> <li>• Receptors</li> <li>• How viruses get into cells</li> <li>• How viruses traffic within cells</li> <li>• Early stages of the viral life cycle</li> <li>• Genome replication</li> </ul>	Dr. Imperiale
<b>OCT 10</b> Lecture 3	Principles of Replication II	<ul style="list-style-type: none"> <li>• Genome replication, continued</li> <li>• Assembly</li> <li>• Egress</li> <li>•</li> </ul>	Dr. Imperiale
<b>OCT 12</b> Lecture 4	Viral Pathogenesis	<ul style="list-style-type: none"> <li>• Transmission</li> <li>• Epidemiology</li> <li>• Immune response</li> <li>• Immune evasion</li> <li>• How viruses cause disease</li> </ul>	Dr. Imperiale
<b>OCT 19</b> Lecture 5	Influenza	<ul style="list-style-type: none"> <li>• Viral genetics</li> <li>• Zoonosis</li> <li>• Vaccines</li> <li>•</li> </ul>	Dr. Imperiale
<b>OCT 24</b> Lecture 6	Herpesviruses	<ul style="list-style-type: none"> <li>• Persistent infection</li> <li>• Latency and reactivation</li> </ul>	Dr. Imperiale
<b>OCT 26</b> Lecture 7	HIV and Other STIs	<ul style="list-style-type: none"> <li>• Retroviruses</li> <li>• Chronic infections</li> <li>• Vaccine hurdles</li> <li>• Viral reservoirs</li> <li>• Antivirals and resistance</li> </ul>	Dr. Imperiale
<b>OCT 31</b> Lecture 8	Oncogenic Viruses	<ul style="list-style-type: none"> <li>• Cellular growth control</li> <li>• Oncogenes</li> <li>• Tumor suppressor genes</li> <li>• Viral oncogenes</li> <li>• Vaccines</li> </ul>	Dr. Imperiale
<b>Nov 2</b> Lecture 9	Emerging Viruses and SARS-CoV-2	<ul style="list-style-type: none"> <li>• Insect vectors</li> <li>• Central nervous system viruses</li> <li>• Hemorrhagic viruses</li> <li>• COVID-19</li> <li>• Zoonoses</li> <li>• Vaccines and antivirals</li> <li>• Future spillovers</li> </ul>	Dr. Imperiale
<b>Nov 3</b> Pre-exam discussion	<u>Optional</u> Virtual mode	6-7pm	Dr. Imperiale
<b>Nov 6</b>		<ul style="list-style-type: none"> <li>• Open book exam</li> </ul>	Dr. Imperiale

<b>Exam Unit 2</b>	Virtual mode	<ul style="list-style-type: none"> <li>• 50 questions</li> <li>• 2 hours</li> </ul>	
		<b>End of the Virology Module</b>	
<b>Nov 7</b> Lecture 1	Intro to Bacteria	<ul style="list-style-type: none"> <li>• Describe bacterial size, shape &amp; aggregation patterns</li> <li>• Describe the major bacterial cell structures &amp; their functions</li> <li>• Understand differences between Gram positive and Gram-negative bacteria and the basis for the Gram stain</li> <li>• Understand basics of bacterial genetics</li> <li>• How do bacteria cells &amp; genetics differ from those of eukaryotic cells?</li> </ul>	Dr. Hanna
<b>Nov 9</b> Lecture 2	Antibiotics & Resistances	<ul style="list-style-type: none"> <li>• Understand the underlying principles for anti-bacterial therapeutics</li> <li>• Describe the major classes of antibiotics, their cellular targets and modes of action</li> <li>• Understand the causes and consequences of current &amp; emerging resistances to antibiotics</li> <li>• Describe the genetics and physiology of antibiotic resistance</li> </ul>	Dr. Hanna
<b>Nov 14</b> Lecture 3	Bacterial Pathogens & their Virulence Factors	<ul style="list-style-type: none"> <li>• Know &amp; apply the principles of Koch's Postulates</li> <li>• Describe the major classes of virulence factors, with examples, &amp; and their specific contributions to infections</li> <li>• Describe the molecular actions of bacterial toxins and their roles in pathology during infection</li> </ul>	Dr. Hanna
<b>Nov 16</b> Lecture 4	The Staphylococci	<ul style="list-style-type: none"> <li>• Describe the various infections &amp; associated pathologies of Staphylococcal infections</li> <li>• Describe the virulence mechanisms of <i>S. aureus</i> and their specific roles in infections</li> <li>• Describe the role of host during <i>S. aureus</i> infections</li> </ul>	Dr. Hanna
<b>Nov 21</b> Lecture 5	The Streptococci & Pneumococci	<ul style="list-style-type: none"> <li>• Describe the various infections &amp; pathologies for these major human pathogens</li> <li>• Understand and describe the roles of the major <i>S. pyogenes</i> virulence factors</li> <li>• Understand and describe the roles of the major <i>S. pneumoniae</i> virulence factors</li> <li>• Describe the roles of host during these infections</li> </ul>	Dr. Hanna
<b>Nov 28</b> Lecture 6	Corynebacterium & Listeria	<ul style="list-style-type: none"> <li>• Compare and contrast these pathogens, their infections &amp; associated pathologies</li> <li>• Describe <i>C. diphtheriae</i> specific virulence factors &amp; mechanisms</li> <li>• Describe <i>L. monocytogenes</i> specific virulence factors &amp; mechanisms</li> </ul> <p>Compare &amp; contrast the various roles of the host immune responses for each infection</p>	Dr. Hanna
<b>Nov 30</b> Lecture 6	GI Infections - I	<ul style="list-style-type: none"> <li>• Describe infections caused by <i>H. pylori</i>, <i>V. cholerae</i> &amp; <i>C. difficile</i></li> <li>• Understand specific virulence factors employed by each pathogen</li> </ul>	Dr. Hanna

		<ul style="list-style-type: none"> <li>Be able to differentiate between each, and compare &amp; contrast with each other (including those from next lecture)</li> </ul>	
<b>Dec 5</b> Lecture 8	GI Infections - II	<ul style="list-style-type: none"> <li>Describe infections caused by the <i>E. coli</i> &amp; the <i>Shigella</i></li> <li>Understand specific virulence factors employed by each pathogen</li> <li>Be able to differentiate between each, and compare &amp; contrast with each other (including those from previous lecture)</li> </ul>	Dr. Hanna
<b>Dec 7</b> Lecture 9	The Mycobacteria	<ul style="list-style-type: none"> <li>Describe the infections caused by <i>M. tuberculosis</i></li> <li>Describe the infection caused by <i>M. lepreae</i></li> <li>Describe the virulence strategies for each</li> <li>Describe the role of the host for each</li> </ul>	Dr. Hanna
<b>Dec 8</b> Pre-exam discussion	<u>Optional</u> Virtual mode	6-7pm	Dr. Hanna
<b>Dec 11</b> <u>Exam</u> <u>Unit 3</u>	Virtual mode	<ul style="list-style-type: none"> <li>Open book exam</li> <li>50 questions</li> <li>2 hours</li> </ul>	Dr. Hanna
		<b>End of the Bacteriology Module</b>	

Dec 17

**END of COURSE**