**Foundations I Schedule**

**Course Overview**

The objective of this course is to familiarize learners with core concepts in immunology, microbiology, and virology. Accordingly, the course is divided into 10 weeklong sessions in which a core component of mammalian immunity is introduced, followed by an examination of how microbial pathogens evade or dismantle the immune response.

**Course Structure**

The course will run over the entire Summer Session from **June 2nd to August 7th**. Each session will last one week and students / faculty preceptors will meet in **MCNA5305** for **one hour three times weekly** (**MWF**) **from 1p-2p unless otherwise noted below**. Students will receive assigned reading and a list of questions for discussion prior to each session. Each student will be expected to come prepared at each session to discuss the week’s material and questions. Faculty preceptors will receive a preceptor syllabus with suggested answers to each discussion topic as well as an additional list of targeted questions for further discussion.

**Evaluations**

Students will be evaluated based on participation and level of preparedness in answering discussion questions.

**Session 1: June 3rd (1p-3p), 5th**

Immunology theme: Neutrophils / Innate Immunity

Microbiology theme / clinical presentation: Invasive staphylococcal infection

Faculty Preceptor: **Jim Cassat**

Required Reading:

* Abbas, Chapter 2 (Neutrophils); Chapter 3 (Overview of leukocyte migration, leukocyte recruitment, chemokines and receptors, leukocyte-endothelial interactions, migration to sites of injury / infection); Chapter 4 (overview of innate immunity, recognition of microbes and damaged self, cell-associated pattern recognition receptors, the inflammatory response, recruitment of leukocytes, ingestion and killing of microbes).
* Otto M. *S. aureus* toxins. Curr Opin Microbiol 2014.
* Rigby and DeLeo, Neutrophils in innate host defense against *Staphylococcus aureus* infections, Seminars in Immunopathology, 2012.

**Session 2: June 8th, 10th (2p-3p), 12th**

Immunology theme: Mucosal immunology and the microbiome

Microbiology theme / clinical presentation: *C. difficile* colitis

Faculty Preceptor**: Dave Aronoff**

Required Reading:

* Abbas chapter 14 (all sections up to the Cutaneous Immune System)
* Rupnik et al., *Clostridium difficile* infection: new developments in epidemiology and pathogenesis, July 2009, Nature Rev Microbiology (PMID: 19528959).
* Pflughoeft and Versalovic, Human microbiome in health and disease, 2012 Annual Rev Pathology (PMID: 21910623).
* Explore the Human Microbiome Project website: <https://commonfund.nih.gov/hmp/index>.

**Session 3**: **June 15th, 17th, 19th**

Immunology theme: Macrophage

Microbiology theme / clinical presentation: Tuberculosis

Faculty Preceptor: **Kyra Richter**

Required Reading:

* Abbas Chapter 2 (Mononuclear phagocytes); Chapter 4 (Review ingestion and killing of microbes, other functions of activated macrophages, mechanisms that limit innate immune responses). Chapter 10 (Overview of cell-mediated immunity, Functions of TH1 cells, Roles of TH2 cells in host defense); Chapter 16 – Immunity to Microbes (immunity to extracellular bacteria, immunity to intracellular bacteria).
* Baena, A. & Porcelli, S. A. Evasion and subversion of antigen presentation by *Mycobacterium tuberculosis*. *Tissue Antigens* **74**, 189–204 (2009).
* Sherris Medical Microbiology, 6th Edition: Chapter 27 Mycobacteria (Introduction and *Mycobacterium tuberculosis* sections).

**Session 4: June 22nd, 24th, 26th**

Immunology theme: Antigen presentation

Microbiology theme / clinical presentation: Cytomegalovirus, EBV, or

HSV/VZV

Faculty Preceptor: **Luc Van Kaer**

Required Reading:

* Abbas Chapter 2 (Antigen Presenting Cells and Lymphocytes); Chapter 6.
* Jawetz, Melnick, & Adelberg's Medical Microbiology, 26th Edition; Chapter 33: Herpesviruses (Introduction, Properties of Herpesviruses; section on CMV).
* Mocarski, ES. Immune escape and exploitation strategies of cytomegaloviruses: impact on and imitation of the major histocompatibility system; Cellular Microbiology, 2004 (PMID: 15236638).

**Session 5: June 29th (2p-3p), July 1st(2p-3p), July 3rd (2p-3p)**

Immunology theme: The complement system

Microbiology theme / clinical presentation: *N. meningitidis* bacteremia and meningitis

Faculty Preceptor: **Eric Skaar**

Required Reading:

* Abbas Chapter 4 and 13 (sections on the complement system, pentraxins, and collectins/ficolins).
* Lewis and Ram, Meningococcal disease and the complement system, Virulence Jan 2014 (PMID: 24104403).
* Lo *et al*, Mechanisms of avoidance of host immunity by *Neisseria meningitidis* and its effect on vaccine development, July 2009 Lancet Infectious Diseases (PMID: 19555901).

**Session 6: July 6th, 8th, 10th (Chris)**

**Session 7: July 13th, 15th, 17th (Spyros)**

Immunology theme: Cell mediated immunity

Microbiology theme / clinical presentation: HIV/AIDS

Faculty Preceptors: **Chris Aiken and Spyros Kalams**

Required Reading:

* Abbas Chapter 4 (NK cell section); Chapter 8 (Overview of lymphocyte development, rearrangement of antigen receptor genes, T lymphocyte development); Chapter 9; Chapter 10; Chapter 21 (all sections after Acquired [Secondary] Immunodeficiencies).

**Session 8: July 20th, 22nd, 24th**

Immunology theme: Tumor Immunology

Microbiology theme / Clinical presentation: HPV, cervical cancer

Faculty Preceptor: **Terry Dermody**

Required Reading:

* Abbas Chapter 18.
* Schiller and Lowy, Understanding and learning from the success of prophylactic human papillomavirus vaccines, Oct 2012 Nature Rev Microbiology (PMID: 22961341).
* Moore and Chang, Why do viruses cause cancer? Highlights of the first century of human tumour virology, Dec 2010 Nature Rev Cancer (PMID: 21102637).

**Session 9: July 27th, 29th, 31st**

Immunology theme: Antibody structure, function, and diversity

Microbiology theme / clinical presentation: Influenza

Faculty Preceptor: **Scott Smith**

Required Reading:

* Abbas Chapter 5, Chapter 8 (overview of lymphocyte development, rearrangement of antigen receptor genes, B lymphocyte development), Chapter 12.
* Medina and Garcia-Sastre, Influenza A viruses: new research developments, Aug 2011, Nature Rev Microbiology (PMID: 21747392).

**Session 10: August 3rd, 5th, 7th**

Immunology theme: Shock / sepsis / pro-inflammatory cascade

Microbiology theme / clinical presentation: Malaria

Faculty Preceptor: **Jim Cassat**

Required Reading:

* Abbas Chapter 4 (the inflammatory response), Chapter 16 (immunity to parasites).
* Halder et al, Malaria: Mechanisms of Erythrocytic Infection and Pathological Correlates of Severe Disease Feb 2007 Annual Review of Pathology: Mechanism of Disease (PMID: 18039099).