Session 1: An Introduction to Immunobiology

Text: Chapters 1, 2, 3
Time: 5 Class Periods
Objectives: These are introductory chapters that introduce many of the important concepts of immunology that are then presented in more detail in the rest of the text. You should develop a basic, conceptual understanding of the structure and function of the immune system, and the important distinctions between innate and adaptive immune mechanisms. Understanding the major concepts is critical: Knowing all the particular details, and there are many of them, is unimportant at this point in our course.
Interest: Essential. Questions: OK. Time: We have a little of it. So: Patience is a virtue.

Chapter 1 - Elements of the Immune System and Their Roles in Defense

Intro	*Read*	
1-1	*Read*	Flora? *Review* Fig 1.2.
1-2	*Read*	Differentiate: Commensals from parasites and opportunists. *Review* Figs 1.3 & 1.4 for fun.
1-3	*Read*	What are mucosal barriers? *Review* Figs 1.5 & 1.6.
1-4	*Read carefully*	Develop a good understanding of innate immunity. *Read* Figs 1.7 & 1.8.
1-5	*Read carefully*	Develop a good understanding of adaptive immunity and the characteristics of adaptive immunity. Understand Fig 1.10. Differentiate innate and adaptive immunity. *Read* Fig 1.9.
1-6	*Read*	Are both forms of immunity important? *Read* Fig 1.11.
1-7	*Read*	Note the functions of the various cells of the immune system, but don't memorize all the cell types. *Read* Fig 1.12: it's a nice summary of cell functions. Understand the importance of bone marrow and hematopoietic stem cells. Develop a concept of the diversity of cells of the immune system and how they develop, but don't memorize details. *Read* Figs 1.13 to 1.17.
1-8	*Read*	Understand the anatomy of the immune system. Differentiate: Primary vs secondary lymphoid tissue. *Review* Figs 1.18 & 1.19 and understand how the anatomy of the immune system contributes to defense.
1-9	*Read*	Understand conceptually the architecture of lymphoid tissue and the location of the various cells of the immune system in this tissue. *Review* Figs 1.20 to 1.22.
1-10	*Read*	Understand conceptually the architecture of spleen and the location of the various cells of the immune system in this tissue. *Review* Fig 1.23.
1-11	*Read*	Understand conceptually the architecture of gut lymphoid tissue and the location of the various cells of the immune system in this tissue. *Review* Fig 1.25.
1-12	Read	What is 'immunological memory'? *Review* Figs 1.26 & 1.27.
1-13	*Read*	Can you differentiate immunodeficiency from immunosuppression?
Summ	*Read*	Try to develop a basic understanding of the various functions of the immune system, how it is organized, and the basic principles that govern how it functions.

Chapter 2 – Innate Immunity

Intro	*Read*	
2-1	*Read*	How do microorganisms cause tissue damage in hosts? *Review* Figs 2.1 & 2.2.
2-2	*Review*	Concentrate on paragraph 1. *Review* Figs 2.3 and 2.5.
2-3	*Review*	Note only that this is a 'pathway' to achieve an end. *Review* Fig 2.6.
2-4	*Review*	Note only that the 'pathway' is regulated.
2-5	*Read carefully*	Understand the process of phagocytosis. *Read* Fig 2.10.
2-6	*Review*	Note only the end product function of complement activation. *Review* Fig 2.13.
2-7	*Review*	Note only the intermediate product function of complement activation. *Review* Fig 2.13.
2-8	*Review*	
2-9	*Read*	Defensins are becoming recognized as important molecules. *Review* Fig 2.18.
2-10	*Read*	Evolution! *Read* Fig 2.19.
2-11	*Read*	Understand TLR's. *Review* Figs 2.20 & 2.21.
2-12	*Summarize*	This is much more complicated than we need to worry about at this time.
2-13	*Read*	Define: Chemokines inflammation, and inflammatory mediators. Do not worry about the excess details. *Review* Figs 2.27 & 2.29.
2-14	*Read*	What are neutophils?
2-15	*Read*	Understand the preliminary events in phagocytosis. *Read* Figs 2.30 & 2.31.
2-16	*Read*	Understand mechanisms of killing. *Read* Figs 2.32 to 2.34.
2-17	*Read*	Understand the acute phase response. *Review* Figs 2.36 & 2.38.
2-18	*Summarize*	
2-19	*Summarize*	
2-20	*Read*	Understand mechanism of type 1 (alpha) interferon. *Read* Fig 2.44. *Review* Fig 2.45.
2-21	*Read*	Why do we need NK cells? *Review* Fig 2.47.
2-22	*Read*	How do NK cells do recognition? *Review* Figs 2.48 & 2.49.
Summ	*Read*	Yes-this is very challenging. Do your best to get a perspective on the diverse mechanisms of innate immunity, without getting bogged down in excess detail. This chapter should take you about 3 hours to read and take notes, not more.

Chapter 3 – Principles of Adaptive Immunity

Intro	*Read*	
3-1	*Read*	Develop a concept of 'specificity' based on B- and T-cell receptors.
3-2	*Read very carefully*	Define: Antigen, antigen receptor, and antigenic determinant. Understand Figs 3.1 & 3.2 and the basic structure of antibody, s-Ig as B cell receptor and TCR as T cell receptor.
3-3	*Read carefully*	Develop a concept of somatic recombination and somatic hypermutation. Why is this important for antigen reception. *Review* Figs 3.3 & 3.4.
3-4	*Read very carefully*	Develop a very good understanding of Clonal Selection and Expansion. See Fig 3.5.
3-5	*Read*	What do dendritic cells do? Understand Fig 3.6.
3-6	*Read carefully*	Why is antigen processing necessary? Understand Fig 3.7.
3-7	*Read carefully*	Understand how antigen is recognized by the immune system. Develop a concept of the MHC. Why is the MHC important, even necessary?
3-8	*Read very carefully*	Understand MHC class I and class II molecules (Fig 3.8), and the how they present peptides to cytotoxic (Tc or CD8)and helper (Th or CD4) T cells (Fig 3.9).
3-9	*Read carefully*	Understand Fig 3.10.
3-10	*Read carefully*	Understand Fig 3.11.
3-11	*Read carefully*	How do B cells recognize antigen (Fig 3.12)? How do Th cells help B cells (Fig 3.13)?
3-12	*Read very carefully*	Understand the various classes of immunoglobulins isotypes. Understand the various functions of immunoglobulins isotypes: neutralization, enhanced phagocytosis and opsonization. Understand Fig 3.14 very well.
3-13	*Read carefully*	Define somatic hypermutation and class switching and how these contribute to increased immunity. See Fig 3.15.
3-14	*Read carefully*	Why are memory B cells better than naïve B cells at providing immunity?
3-15	*Read very carefully*	Define Tolerance. Relate Clonal Development to tolerance. Define apoptosis. Work on understanding positive and negative selection of T cells. Understand Fig 3.16 and the process of T cell selection in the thymus.
3-16	*Read very carefully*	Define: Hypersensitivity (i.e. allergy), autoimmunity, immunodeficiency and immunosuppression. *Read* Figs 3.17 & 3.18.
Summ	*Read carefully*	