Objectives
Upon completing the assignments for this module, the student will be able to:

1. Summarize the specific events in early stage T lymphocyte (cell) development.
2. Define thymocyte.
3. Explain the specific events in late stage T lymphocyte development including:
   a. positive selection
   b. negative selection
   c. lineage commitment
4. Recall where T lymphocyte maturation occurs.
5. Discuss the role of Notch in T lymphocyte development.
6. Explain the double-negative stage of T lymphocyte development including:
   a. DN1
      i. genotype
      ii. location
      iii. description
   b. DN2
      i. genotype
      ii. location
      iii. description
   c. DN3
      i. genotype
      ii. location
      iii. description
   d. DN4
      i. genotype
      ii. location
      iii. description
7. Define the following surface markers:
   a. C-kit (CD117)
   b. CD44
   c. CD25
8. Recall the role of the two different T cell receptors in the immune response for:
   a. TCR_{αβ}
   b. TCR_{γδ}
9. Contrast the characteristics of the TCR_{αβ} and TCR_{γδ} T cells.
10. Explain the β selection process
    a. pre-T_{α} chain
    b. pre-TCR receptor
    c. pre-TCR signaling cascade
11. Discuss the double-positive (DP) phase of thymocyte development
12. Discuss the selection process for DP thymocytes
13. Discuss clonal deletion.
14. Define the location where:
    a. negative selection occurs
    b. positive selection occurs
15. Discuss the development of T lymphocytes including:
   a. location
   b. selection process
   c. early development stages
   d. positive and negative selection
   e. TCR development
   f. cell line development
16. Recall the number of thymocytes that fail to make it through:
   a. positive selection
   b. negative selection
17. Discuss regulatory T cells (T_{reg}) in terms of:
   a. CD expression
   b. immune response role
   c. induced T_{reg}
   d. natural T_{reg}
18. Differentiate apoptosis from necrosis.
19. Describe the role of caspases in cell death pathways including the involvement of:
   a. initiator
   b. necrosis
20. Illustrate the morphological changes associated with:
   a. apoptosis
   b. necrosis
21. Classify the role of the proteins involved in apoptosis, including:
   a. protein name
   b. location in the cell
   c. function
   d. role in apoptosis
22. Compare the two pathways of apoptosis.

Assignments
1. Read Chapter 9 in Kuby Immunology, 7th Ed.
2. Watch T cell Development and Regulatory T Cells video
3. Go to the website and watch:
   http://www.dnatube.com/video/2509/T-Cell-Development-Animation
   This is a short, 3 minute T cell development video
4. For additional information, go to the website:
   http://www.bio.davidson.edu/courses/immunology/flash/main.html
   Animation of positive and negative selection.
5. For additional information, go to the website:
   www.bio-alive.com/categories.apoptosis.htm
   Videos of apoptosis.
6. Take the Unit 7 graded quiz.