At the end of this unit, the student should be able to:

1. Identify the relationship between wavelength and energy using Planck’s formula.
2. List in order the seven (7) colors contained in white light.
3. Describe at least five (5) instruments that measure either the absorption or emission of radiant energy to determine the concentration of atoms or molecules.
4. Define the three (3) basic types of spectra and indicate the type(s) of material that would absorb or emit them.
5. Identify, define, and apply the Beer-Lambert Law in the calculation of the concentration of an unknown.
6. Define the variables that affect absorbances in the equation
   \[ A = a \times b \times c \]
7. Evaluate the result of plotting %T values versus concentration on linear and semi-log papers.
8. Evaluate the result of plotting absorbance versus concentration on linear paper.
9. Draw and identify the basic components of the following:
   a. single beam spectrophotometer
   b. double beam spectrophotometer
   c. atomic absorption spectrophotometer
   d. nephelometer
   e. fluorometer
   f. scintillation counter
10. Compare and contrast colorimeters, filter photometers and spectrophotometers.
11. List and state the function of the following spectrophotometer components:
   a. light source
   b. monochromator
   c. cuvet
   d. photodetector
   e. read-out device
12. Define: band pass
13. Describe three (3) ways in which spectrophotometer function should be validated.
14. Compare and contrast the principles of light spectrophotometer and nephelometer in the measurement of turbidity.
15. Compare and contrast the principles and of light spectrophotometry and atomic absorption spectrophotometry.
16. Describe the purpose of a “chopper” in an A.A.S.
17. State the function of the A.A.S.
18. Describe the principle of measuring electromagnetic radiation using fluorometry.
19. Describe the advantages and disadvantages of fluorometry.
20. Identify the purpose of a scintillation counter.
21. Compare and contrast gamma rays with visible light energy.
22. State and be able to use the formula to calculate results from procedures using a scintillation counter.
23. Draw and identify the basic components of a galvanic cell.
25. Draw and identify the basic components of an electrolytic cell.
26. Describe a calomel electrode.
27. Define electrode selectivity and describe what makes it possible.
28. List two (2) types of reference electrodes and indicate their advantages/disadvantages.
29. State the most commonly used liquid junction and describe its purpose.
30. Describe the principle behind pH sensitive glass electrodes.
31. State the simplified form of the Nernst equation and define its components.
32. Identify and describe four (4) major types of ion selective electrodes.
33. Describe the Severinghaus PCO₂ electrode.
34. Describe the Clark PO₂ (polarographic) electrode.
35. Define coulometry.
36. Draw and indicate the basic components of a coulometric amperometric chloridometer.
37. Define: stationary phase, mobile phase, elution (eluate) and retention time.
38. List four (4) advantages to automated procedures.
39. Describe the basic approaches in automated instruments.
40. Define the following as they relate to automated laboratory instruments:
   a. test repertoire
   b. random-access analyzers
   c. throughput
   d. dwell time
41. Identify resources that are required to produce a patient test and must be considered in the cost of the test.
42. Briefly describe the basic characteristics of common automated instruments and the recent trends in clinical chemistry.
43. Describe the theory of "moving boundary electrophoresis" proposed by Tiselius.
44. List five (5) major protein bands demonstrated by protein electrophoresis.
45. Draw and identify the basic components of an electrophoresis apparatus and densitometer.
46. Describe the relationship of buffer pH to the movement of proteins.
47. List and briefly describe three (3) types of electrophoresis support materials.
48. Explain the concept of electroendosmosis and identify the protein fraction most affected by it.
49. Evaluate basic molecular diagnostic techniques utilized in modern clinical chemistry.
50. Describe two (2) methods of determining osmolality.
51. Evaluate the issues and analytical techniques for POCT.
52. Recall principles and techniques of immunoassays as previously discussed in Immunology / Serology.