Upon successful completion of the Chem M11 course, a student should be able to:

1. analyze and apply the scientific method to chemistry problems, including developing a hypothesis, hypothesis testing, evaluation, and modeling.

2. calculate and measure mass, volume, and length using laboratory devices properly and know their relative precision.

3. list the basic units of measurement in the metric and English systems, perform unit conversions within and between systems, and express results appropriately with significant figures and in scientific notation.

4. classify matter, distinguish between physical and chemical changes, comprehend the principles of chemical reactions and energy relationships, and perform various stoichiometric calculations.

5. list and describe the distinguishing characteristics of solids, liquids, gases, and solutions.

6. identify the basic components of the nuclear atom, account for the existence of ions and isotopes, identify the symbols of common elements, draw the structures of molecules and ions, and recognize various inorganic, organic, and biochemical compounds.

7. analyze saturated hydrocarbons, unsaturated hydrocarbons, cyclic compounds, alcohols, aldehydes, ketones, amines, and carboxylic acids and their derivatives.

8. classify carbohydrates, lipids, proteins, and examine their relationship to the human body.

9. formulate an understanding of nucleic acids and their relationship to DNA and RNA.

10. demonstrate an understanding of metabolism and biochemical energy production.

11. experiment with acids and bases, alkanes, alkenes, alcohols, aldehydes, ketones, amines, carboxylic acids and their derivatives, proteins, DNA, and enzymes.

12. apply the techniques of chromatography, dialysis, filtration, and differential solubilities to separate and analyze mixtures.