General Chemistry II **Dr. M. J. Wieder**
Topic: Redox and Electrochemistry

The student should be able to:

1. Determine the oxidation state of an element in a given compound or ionic species.

2. Define and recognize examples of oxidation and reduction.

3. Balance redox equations in either acidic or basic media using the ion-electron (half-equation) method.

4. Identify the oxidizing agent and the reducing agent in a given redox reaction.

5. Determine the equivalent weight of an oxidizing agent or reducing agent given a balanced redox equation.

6. Determine the normality of a solution of oxidizing agent or reducing agent given its molarity and a balanced redox equation.

7. Solve titration problems related to redox reactions given volume and molarity/normality data.

8. Differentiate between a galvanic (voltaic) cell and an electrolytic cell.

9. Define and recognize examples of electrolysis.

10. Recognize the anode and the cathode of an electrochemical cell based on the chemical reaction occurring at each.

11. Write the conventional notation for a galvanic cell given its components.

12. Draw a (crude) diagram of a galvanic cell given its components or its conventional notation.

13. Define standard reduction potentials.

14. Determine the cell potential for a spontaneous redox reaction given its standard reduction potentials for the half-cell reactions.

15. Predict the feasibility of redox reactions given a table of standard reduction potentials for the half-cell reactions.

16. Given a list of standard reduction potentials for various half-cell reactions, predict which species would be the most (least) powerful oxidizing agent and which would be the most (least) powerful reducing agent.

17. Determine the equilibrium constant for a given galvanic cell from its standard cell potential.

18. Calculate the cell potential of a galvanic cell at other than standard conditions using the Nernst equation.

19. Relate the magnitude of the standard cell potential to the magnitude of the equilibrium constant and to the standard free energy change for the redox reaction.

20. For an electrolytic cell, use Faraday's law to calculate the mass of a chemical species that is consumed/produced in a redox reaction.