

REGULAR COURSE SYLLABUS

School of: Letters, Arts & Sciences

Department: Chemistry

CIP Code: 40.0502

Prefix & Course Number: CHE 3000

Crosslisted With*: _____

Course Title: Analytical Chemistry

Check All That Apply: Required for Major: Required for Minor: Specified Elective: _____

Required for Concentration: Elective: _____ Service Course: _____

Credit Hours: 3 (3+0)

Total Contact Hours per semester (assuming 15-16 week semester):

Lecture 45 Lab _____ Internship _____ Practicum _____ Other (please specify type and hours): _____

Schedule Type(s): L Grading Mode(s): L

Variable Topics Courses (list restrictions, including the maximum number of hours that can be earned**): _____

** NOTE: This information must be included in the course description.

Restrictions (Variable Topics Course): None

Prerequisite(s): CHE 1800, CHE 1810, CHE 1850

Corequisite(s): CHE 3010

Prerequisite(s) or Corequisite(s): _____

Banner Enforced:

Prerequisite(s):

Corequisite(s):

Prerequisite(s) or Corequisite(s):

Catalog Course Description:

This course studies the fundamentals of analytical chemistry including principles of gravimetric, volumetric, potentiometric, and spectrophotometric analyses. Chemical literacy as it applies to analytical chemistry will be introduced.

APPROVED:

Charles G. Tindall

10/7/05

Department Chair OR Program Director

11/18/05

Date

Dean OR Associate Dean

Kinda F. Curran

Date

2/6/06

Associate VP, Academic Affairs

Date

Required Reading and Other Materials will be equivalent to:

Exploring Chemical Analysis, 3rd Edition, Harris, WH Freeman & Co, 2005.

Specific, Measurable Student Behavioral Learning Objectives:

Upon completion of this course the student should be able to:

1. Determine the solubility of precipitates.
2. Determine the conditions for maximum stability of precipitates.
3. Determine the conditions necessary for quantitative precipitation.
4. Compute the pH of solutions of strong acids, strong bases, weak acids, weak bases, polyprotic acids, poly basic compounds, and arbitrary mixtures of the above.
5. Compute theoretical titration curves for acids and bases of arbitrary types.
6. Choose indicators for acid-base titrations, precipitation titrations, complexation, and redox titrations.
7. Calculate cell potentials using the Nernst equation.
8. Calculate species concentrations in simple complexation reactions.
9. Calculate redox titration curves for oxidation-reduction titrations.
10. Calculate theoretical titration curves in simple and multiple complexation reactions at various pH.
11. Choose optimum conditions for selective complexometric titration using masking agents and/or control of pH.
12. Finalize the Beer-Lambert Law to find E values and concentrations.
13. Choose optimum wave length values for analysis from an absorption curve.
14. Perform a calculation for multi-component spectrophotometric analysis.
15. Recognize and apply the limitation of applicability of the Beer-Lambert Law.
16. Explain the principles of operation of single beam and double beam spectrophotometers.
17. List and access sources of standard methods and key journals.

Detailed Outline of Course Content (Major Topics and Subtopics) or Outline of Field Experience/Internship (experience, responsibilities and supervision) (format: I, A, 1, a, etc.):

- I. Introduction
- II. Types of Analyses
statistics Applies to Analytical Chemistry
- III. Gravimetric Analysis
Principles of the Methods
solubility equilibria
optimization of precipitation parameters
practical examples
- IV. Volumetric Analysis
equilibria in solution
practical examples
- V. Potentiometry
the Nernst equation and applications
potentiometric cells
potentiometric titrations
- VI. Chemical literacy
sources of standard methods
key analytical chemistry journals

CHE 3000

VI. Spectrophotometry

Beer-Lambert Law

applications

limitations

instrumentation

Evaluation of Student Performance (format: 1, a, i, ii, etc.):

Students will be given periodic fifty minute examinations. These examinations will be supplemented by short quizzes. A final exam one hundred minutes long will terminate the course. The final grade determination will be based on the student's performance on the examinations, quizzes, final exam, and the instructor's evaluation of homework assignments.