I. **Course Title**
Analytical Chemistry

II. **Course Prefix/Number**
CHEM 332

III. **Credit Hours**
3

IV. **Prerequisites**
CHEM 331

V. **Catalog Description**
Chemistry 332 is designed to develop the students’ understanding of instrumental methods/analysis. Topics covered in this course include fundamentals and applications of spectroscopy, mass spectrometry, separations and chromatography and calibration methods. Three lectures per week.

VI. **Curricular Relationships**
CHEM 332 is required for all BA and BS degrees in Chemistry

VII. **Student Learning Outcomes**
- Students will be able to discuss and correctly apply Beer’s Law.
- Students will be able to explain the phenomena associated with the absorption of light by molecules.
- Students will be able to perform spectrophotometric calculations.
- Students will be able to identify and explain the principal components of a spectrophotometer.
- Students will be able to properly use and interpret calibration curves, standard addition curves, and the method of internal standards.
- Students will be able to interpret simple mass spectra for the identification of functional groups.
- Students will be able to discuss the principals of chromatography including quantitative descriptions of separation efficiency.
- Students will be able to identify and explain the principal components of both a gas chromatograph, and a high-performance liquid chromatograph.
• Students will be able to compare and contrast normal-phase and reverse phase liquid chromatography.

• Students will demonstrate an understanding of the principles of ion-exchange, ion, molecular exclusion, and affinity chromatography.

• Students will demonstrate an understanding of the principles and practical application of capillary electrophoresis.

VIII. Content Outline

• Fundamentals of Spectrophotometry

• Applications of Spectrophotometry

• Spectrophotometers

• Calibration Methods

• Atomic Spectroscopy

• Mass Spectrometry

• Introduction to Analytical Separations

• Gas Chromatography

• High-Performance Liquid Chromatography

• Chromatographic Methods and Capillary Electrophoresis

IX. Course Procedures/Policies/Grading Scale

• Students are expected to attend all lecture sessions. Homework is assigned and graded. In addition, online quizzes are administered every week. Typically, four or five hour exams and a comprehensive final exam (standardized ACS examination in instrumental methods) are given for this course.

• Normal grading is used for this course.

  Grading Scale:  
  >90 = A; 80-89 = B; 70-79 = C; 60-69 = D; <60 = F

X. Required/Recommended Readings

The typical text used is the current edition of *Quantitative Chemical Analysis* by Daniel C. Harris

XI. Issues Unique to this Course

Co-Requisite: CHEM 332L, unless the student has successfully completed (grade of C or better) the laboratory in a previous semester.

XII. Additional Departmental Issues

None