I. **Course Title**
Analytical Chemistry

II. **Course Prefix/Number**
CHEM 331

III. **Credit Hours**
3

IV. **Prerequisites**
CHEM 132 and MATH 106 and MATH 107 or MATH 120

V. **Catalog Description**
Chemistry 331 is designed to develop the students’ understanding of classical “wet” chemistry. Topics covered in this course include statistics of experimental data, chemical equilibria, acid/base titrations, EDTA titrations, redox titrations, electrochemistry, and electrochemical applications. Three lectures per week.

VI. **Curricular Relationships**
CHEM 331 is required for all BA and BS degrees in Chemistry

VII. **Student Learning Outcomes**
- Students will be able to make the calculations necessary for solution preparation.
- Students will be able to properly propagate significant figures and uncertainty in calculations.
- Students will be able to perform and interpret common statistical tests to gauge the significance of scientific data.
- Students will be able to describe chemical equilibrium phenomenon and perform calculations necessary to predict and explain experiments.
- Students will be able to include activity coefficients in equilibrium calculations and explain the effect of ionic strength on chemical equilibria.
- Students will be able to discuss and perform calculations on monoprotic and polyprotic acid-base equilibria.
- Students will be able to discuss and perform calculations on the pH of an acid-base titration before, during, and after the equivalence point.
• Students will be able to discuss and perform calculations on the pM of an EDTA titration before, during, and after the equivalence point.
• Students will be able to discuss and perform calculations on electrochemistry fundamentals including galvanic cells, standard potentials, and the Nernst equation.

VIII. Content Outline
• Measurements
• Experimental Error
• Statistics
• Gravimetric and Combustion Analysis
• Chemical Equilibria
• Titrations
• Activity
• Acid-Base Equilibria
• Acid-Base Titrations
• EDTA Titrations
• Fundamentals of Electrochemistry
• Redox Titrations

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 analytical chemistry) 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 331L, unless the student has successfully completed (grade of C or better) the laboratory in a previous semester.

XII. Additional Departmental Issues
None