

Syllabus for
CHE 400—Chemical Instrumentation Laboratory
2.0 Credit Hours
Fall 2003

I. COURSE DESCRIPTION

Emphasis on projects that elucidate the lecture material along with pertinent electronics experiments. Most of the experiments are in spectroscopy, electrochemistry, radiochemistry, thermal analytical methods, and special topics. (Two 3-hour labs.)

Prerequisites: CHE 300 Lecture and Lab.

Corequisite: CHE 400 Lecture.

Lab fee: \$35.00

II. COURSE GOALS

- A. Students will learn about the basic principles of the experimental methods.
- B. Students will discover and understand instrumental techniques through practical laboratory experience.
- C. The ultimate goals are for students to acquire a sound knowledge of the chemical principles involved in measurements and to apply that knowledge in the selection of the most appropriate conditions for an analysis.

III. COURSE OBJECTIVES

As a result of successfully completing this course, the student will be able to do the following:

- A. Recall the advantages, limitations, and applicability of various instrumentation equipment.
- B. Perform accurate data gathering and data analysis. Report data and results in significant figures and in correct scientific format.
- C. Operate major instrumentation equipment correctly, employing established sample handling techniques.
- D. Recall the electrical and mechanical bases of major chemical instrumentation equipment.
- E. Design a plan of chemical analysis for the determination of chemical concentration and/or chemical identity.

IV. TEXTBOOKS

- A. Required Textbooks
Sawyer, D. T.; W. R. Heineman, and J. M. Beebe. Experiments for Instrumental Methods. New York: John Wiley and Sons, 1984
- B. Each student is required to purchase a hardcover, bound laboratory notebook and keep it in detail.

V. POLICIES AND PROCEDURES

A. University Policies and Procedures

1. Attendance at each class or laboratory is mandatory at Oral Roberts University.
2. Double cuts will be assessed for absences immediately preceding or following holidays.
3. Excessive absences can reduce a student's grade or deny credit for the course.
4. Students taking a late exam because of an unauthorized absence will be charged a late exam fee.
5. Students and faculty at Oral Roberts University adhere to all laws addressing the ethical use of others' materials, whether it is in the form of print, video, multimedia, or computer software.
6. Final exams cannot be given before their scheduled times. Students need to check the final exam schedule before planning return flights or other events at the end of the semester.

B. School and/or Department Policies and Procedures

1. The Department of Chemistry adheres to the Assessment policy concerning plagiarism as described in the 2000-2002 University Catalog p. 33, "Written assignments using sources must demonstrate ethical and accurate use of source material. Plagiarism and any unethical or inappropriate use of sources will not be tolerated."
2. The following assessment actions will be taken in the event of documented instances of plagiarism on written assignments, copying of homework assignments, or cheating during examinations:
 - a. An automatic zero will be given for the assignment or exam.
 - b. The original assignment or exam will be kept in the student file and a copy will be given to the student. This could have a negative impact on letters of reference and admission to graduate schools and other postgraduate programs.
 - c. The Department will take repeated offences as grounds for further action.

VI. Course Policies and Procedures

1. Evaluation Procedures

The semester grade will be based on the following:

6 Lab reports	95%
Instructor's evaluation	5%

(attendance, preparation, technique, quizzes)

VII. COURSE CALENDAR

Experiments will be done in several spectrochemical, chromatographical, and electrochemical areas. Two weeks (four laboratory periods) will be allotted for each experiment. Each student is assigned a unique set of six experiments to perform.

- A. Wheatstone Bridge
- B. Operational Amplifiers
- C. UV-visible spectrophotometry
- D. Infrared Spectrophotometry
- E. Atomic Absorption Spectrometry
- F. ICP Emission Spectroscopy
- G. Gas Chromatography
- H. High Performance Liquid Chromatography
- I. Ion Chromatography
- J. NMR Spectroscopy
- K. Polarography
- L. Conductometry
- M. Independent or Group Student Projects

VII. ASSESSMENT SUMMARY

William B. Collier
Name of Instructor

MISSION

The lifestyle at ORU is rooted in the word "Wholeness." ORU seeks to educate the whole person, with balanced emphasis placed on the development of mind, spirit, and body.

GENERAL OUTCOMES

1. Spiritual Development
2. Physical Development
3. Communication
4. Analysis
5. Problem Solving
6. Valuing in Decision Making
7. Social Interaction
8. Global Perspectives
9. Effective Citizenship
10. Aesthetic Responsiveness

CHE 401
Course No.

MAJOR OUTCOMES

Critical Thinking/

Problem Solving

Graduate students with working knowledge of chemical concepts and marketable skills. Analyze chemical problems and offer solutions.

Communication

Communicates effectively and scientifically using the language, concepts, and models of chemistry.

Analysis

Exhibits competency in researching the literature and uses the information for analyzing research data and strategies and also to interpret data correctly.

Valuing in Decision Making

Demonstrates and assesses safe laboratory techniques, procedures, and makes sound scientific decisions about the use of chemicals.

Global Perspective

Graduate globally minded students who choose to use their knowledge and experience to improve life for other people in various parts of the world. (Also working with mission team)

Chemical Instrumentation Lab
Title of Course

COURSE GOALS

Apply modern chemical instrumentation to chemical analysis problems.

Gain actual experience in using chemical instruments in the lab.

Develop better lab notebook skills.

Report the results of chemical measurements in a competent, scientific manner.

Chemistry
Name of Department

ASSESSMENT OF COURSE GOALS

STIMULI:

Six (6) typewritten lab reports that are graded and corrected

Teacher evaluation of student performance via observation in lab

Student response to teacher initiated discussion and questions

CRITERIA:

Faculty evaluation

Performance in using the departmental instruments

Students performance on laboratory unknowns

Comparisons of labs with previous years

Discussions with employers of past students