Syllabus for
**CHE 212—Organic Chemistry II Laboratory**
1.0 Credit Hour
Spring 2001

## I. COURSE DESCRIPTION

Emphasizes the analysis of unknown organic mixtures. These mixtures are representative of the major functional group differences. Uses various spectroscopic instrumental methods in the analysis, (NMR, IR, UV, and mass spectrometry). (One recitation and one 3-hour lab per week.)
Prerequisites: CHE 211 Lecture and Lab or permission of instructor.
Co requisite: CHE 212 Lecture.
Lab fee: $30.

Organic Chemistry 212 lab is an inseparable and indispensable part of CHE 212 lecture. This is a second-semester course in organic chemistry laboratory that is especially designed to illustrate the chemical reactions and properties of molecules discussed in lecture, and to help students learn them. Many basic reaction mechanisms are discussed and demonstrated in the laboratory. This course consists of organic qualitative analysis, and interpretation of various kinds of spectra (NMR, IR, UV and MS).

## II. COURSE GOALS

The purpose of this course is to equip the student with the ability to demonstrate proficiency in making scientific observations, and in using scientific instruments and techniques. Upon completion of this course, the student will also show a proficiency in controlling and directing chemical reactions.

## III. COURSE OBJECTIVES

### A. Terminal Objectives

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

1. Conduct a **benzoin condensation synthesis**.
    a. Describe the chemical reaction involved in benzoin condensation.
    b. Interpret infrared spectra of benzoin and benzaldehyde.
2. Conduct an aldol condensation.
    a. Explain mechanism of reaction
    b. Explain difference between aldol and crossed aldol condensations.
    c. Interpret the infrared spectra of the product.
3. Synthesize **methyl salicylate**, via an esterification reaction.
    a. Review chemistry of esters.
    b. Synthesize methyl salicylate from salicylic acid via an esterification reaction.
    c. Compare the synthesis of aspirin to that of methyl saliyclate.
    d. Discuss the reverse of esterification hydrolysis
    e. Describe the reaction mechanism involved in esterification.
4. Synthesize **polymers.**
    a. Prepare polymers using simple chemical reactions.
    b. Compare three different kinds of polymers – condensation, addition and cross-linked polymers.

c. List a few applications of polymers in every day life.
d. Compare the properties of polyester and polyamide.
e. Read essay, Polymers and Plastics (pg.467-475).

5. Conduct the analysis of different compounds using **spectroscopic** techniques.
   a. Explain the theory and application of NMR, IR and UV-vis spectroscopy.
   b. Use spectroscopy techniques to identify the structure of unknown compounds.
6. Conduct a **qualitative organic analysis** on unknown compounds.
   a. Identify the structure and name of unknown compounds, using a variety of tests.
   b. Use spectral data provided to aid in the identification of the unknowns.

## IV. TEXTBOOKS

### A. Required Textbooks

1. Pavia, Donald., Lampman, Gary. Introduction to Organic Laboratory Techniques. Orlando: Saunders, 1998.

### B. Required Materials

1. Laboratory notebook (bound notebook)
2. Safety glasses
3. Laboratory coat or apron (to be provided)

## 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. Department Policies and Procedures

1. If a student misses the scheduled laboratory period, the student receives a zero for that lab and is not allowed to make up the work. Protective wear is mandatory in the laboratory.
2. The student is responsible for the material and should make arrangements with the instructor to go over the material should there be any questions.
3. The student is allowed to drop the lowest lab and quiz score, for grading purposes, and an excused absence is not held against the student.

### C. Course Policies and Procedures

1. Evaluation Procedures Points

| | | |
|---|---|---|
| a. | Unknown identification, laboratory experiments, and reports | 660 |
| b. | Exams and quizzes | 200 |
| c. | Notebook | 100 |
| d | Laboratory technique | 40 |
| | Total Points | 1000 |

e. The semester's grade based on A - F is determined by the following scale:

| | |
|---|---|
| A | 90 – 100% |
| B | 80 – 89% |
| C | 70 – 79% |
| D | 60 – 69% |
| F | Below 60% |

The instructor reserves the right to change the syllabus.

## VI. COURSE CALENDAR

| WEEK | | EXPERIMENTS* |
|---|---|---|
| (PART I) | | |
| 1. | Check in and general guidelines | |
| 2. | Coenzyme Synthesis of Benzoin | 40 |
| 3. | Aldol Condensation | 48 |
| 4. | Methyl Salicylate (oil of Wintergreen) | 10 |
| 5. | Preparation of Polymers | 56 |
| 6. | Morrison and Boyd Ch.17 and Handout (Spectroscopy) | |
| 7. | Midterm and Introduction to Part II | 57 |
| (PART II) | | |
| 8. – 13. | Organic Qualitative Analysis | |
| | Read and Study carefully the Chapter 57A to 57I | |
| 14. | Check out, and Final Exam | |

*Experimental numbers correspond to chapters in the textbook. For Part II, refer to Expt. 57A to I, Appendix numbers 1 and 2 in Pavia, Lampman, Kriz, and Engel.

ASSESSMENT SUMMARY

| Ablin, Dr. Lois<br>Name of Instructor | CHE 212<br>Course # | Organic Chemistry II Lab<br>Title of Course | Chemistry<br>Name of Department |
|---|---|---|---|
| MISSION<br>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 the mind, spirit, and body.<br>GENERAL OUTCOMES<br>1. Spiritual Development<br>2. Physical Development<br>3. Communication<br>4. Analysis<br>5. Problem Solving<br>6. Valuing in Decision-making<br>7. Social Interaction<br>8. Global Perspectives<br>9. Effective Citizenship<br>10. Aesthetic Responsiveness | MAJOR OUTCOMES<br>1.Critical Thinking/Problem Solving<br>Graduate students with working knowledge of chemical concepts and marketable skills. Analyze chemical problems and offer solutions.<br>2.Communication<br>Communicate effectively and scientifically using the language, concepts, and models of chemistry.<br>3.Analysis<br>Exhibit competency in researching the literature and use of the information to analyze and interpret data and strategies.<br>4.Valuing in Decision-Making<br>Demonstrate and assess safe laboratory techniques, procedures, and make sound scientific decisions about the use of chemicals.<br>5,Global Perspective<br>Graduate globally minded students who choose to use their knowledge and experience to improve life of other people in various parts of the world. (Also working with mission team.) | COURSE GOALS<br>Demonstrate proficiency in manipulation of laboratory apparatus, instruments, and techniques used in organic laboratories.<br><br>Demonstrate ability to synthesize, purify, and identify organic compounds.<br><br>Communicate knowledge of experimental safety hazards and methods used to avoid them.<br><br>Perform qualitative organic analysis to identify an unknown compound using wet chemical and spectroscopic techniques. | ASSESSMENT OF COURSE GOALS<br><br>STIMULI<br><br>Written laboratory reports<br><br>Examinations<br><br>Lab technique<br><br>Lab conduct<br><br>CRITERIA<br><br>Teacher assessment |