CHEM 3131, ORGANIC CHEMISTRY LABORATORY I

Fall Semester, 2014

Chemistry Department, Dr. Treacy Woods, Department Chair

COURSE DESCRIPTION

This course provides instruction in rudimentary organic laboratory techniques, simple organic syntheses, and basic identification of organic compounds by spectroscopy.

COURSE SEQUENCE IN CURRICULUM

CHEM 3131 is the first organic laboratory course.

PRE-REQUISITE INFORMATION

CHEM 3313 or concurrent

INSTRUCTOR INFORMATION

Name:	Dr. Treacy Woods
E-mail:	twoods@hbu.edu
Office Phone:	281-649-3247
Office Location:	S210A
Office Hours:	MWF 10-11AM; Thursday 2-3 PM
Web Page Address, Web Board, ListServ:	The syllabus and a detailed student lab schedule are available on Blackboard.

LEARNING RESOURCES

Course Text:	Carey, Francis A., and Giuliano, Robert M. Organic Chemistry, 9th ed. Mc Graw-Hill, New York, 2014. **Required.**
Laboratory Text:	Williamson, Kenneth L.; Minard, and Masters, Katherine M., Macroscale and Microscale Organic Experiments, 6h ed., Brooks/Cole, Belmont, California, 2011. **Required.**
Supplementary Text:	CHEM 3131 Laboratory Manual, by the HBU Organic Faculty, Fall 2010 edition. **Required.**
Other Required Materials:	Safety goggles, nonprogrammable calculator **Required.**

COURSE OBJECTIVES

Purpose of the course:

This course provides experience with basic organic laboratory techniques and simple organic chemistry. It contains 60 clock hours of laboratory work. Chemistry 3131 is an introduction to organic chemistry laboratory practices. Students learn basic laboratory techniques, perform one step syntheses of several organic compounds, and are introduced to the identification of organic compounds by spectroscopy.

Aims for the course:

1. To perform basic separation techniques such as recrystallization, distillation, extraction, sublimation and column chromatography.
2. To perform basic analytical techniques such as melting point, boiling point, and thin-layer chromatography.
3. To carry out basic organic reactions and isolate and identify the product(s) using the above techniques.

4. To understand the thinking organic chemists employ to identify compounds by spectroscopy.

On completion of this course, students should be able to:

1. Correctly perform laboratory techniques based on information obtained from the text and the laboratory lecture.
2. Understand the chemical principles underlying the laboratory techniques.
3. Develop an attitude of laboratory safety awareness by obtaining information from the text and laboratory lecture, and by working in a safe laboratory environment.
4. Perform foundational separation techniques such as recrystallization, distillation, extraction, chromatography (thin-layer, column) and sublimation.
5. Perform several one-step syntheses of organic compounds.
6. Understand and demonstrate the principles of stoichiometry and theoretical yield. Write laboratory reports documenting the quality of the results they obtained and demonstrating a command of the principles involved.
7. Understand when a spectrum fits an organic compound.
8. Pass written quizzes or exams demonstrating a command of the principles involved in the organic lab techniques, syntheses, or spectroscopic identification.
9. Write laboratory reports that demonstrate the ability to communicate the results of experiments expected of chemists.
10. Use STN Easy to locate journal articles in the chemical literature.

RELATION TO DEPARTMENTAL GOALS AND PURPOSES

The chemistry department prepares students to respond to their call to share in the wise stewardship of the matter that makes up all of creation in their chosen career. The chemistry department provides a program for students that gives them:

"A thorough and practical knowledge of the intricate nature of matter;"

"The ability to explore and discover the depths of the beauty of matter;"

"The ability to analyze problems, formulate solutions to problems, and be creative in response to challenges related to the wise use of matter;"

"The ability to respect the matter in creation through preparation for excellent and ethical practice of chemistry in their chosen career."

"The opportunity to complete a major that is comparable in curriculum to those at institutions with chemistry majors certified by the American Chemical Society (ACS.)"

RELATION TO COLLEGE GOALS AND PURPOSES

"…to prepare students for careers and further education in the natural sciences and mathematics in a nurturing Christian environment. The College will also serve the HBU community by providing science and mathematics classes that empower HBU students to meet the goals and requirements of their field of study and enrich their liberal arts education."

RELATION TO THE PURPOSE STATEMENT OF THE UNIVERSITY

University mission and purpose statement from the Houston Baptist University Catalog, 2009-2010: "…to provide a learning experience that instills in students a passion for academic, spiritual, and professional excellence as a result of our central confession, "Jesus Christ is Lord"

"…Committed to providing a responsible and intellectually stimulating environment that:

- fosters spiritual maturity, strength of character, and moral virtue as the foundation for successful living

- develops professional behaviors and personal characteristics for life-long learning and service to God and to the community

- meets the changing needs of the community and society

- remains faithful to the **'Nature of the Institution'** statement"

"…Promotes learning, scholarship, creative endeavor, and service".

ATTENDANCE

Please see the official Attendance Policy in the HBU Classroom Policy on Blackboard. Students missing more than 25% of the class will be given a failing grade.

A roll sheet will be distributed in CHEM 3131 each class day. Be sure to sign it. If a student misses a lab for any reason, the lab report for the missed lab will become a zero and will become a possibility for the student's one dropped lab report score.

ACADEMIC ACCOMODATIONS

Students needing learning accommodations should inform the professor immediately and consult the Academic Accommodations section of the HBU Classroom Policy posted on Blackboard.

COURSE REQUIREMENTS & GRADE SCALE

Course requirements:

Students will:

1. read all assigned material before attending lab.
2. attend all lab lectures and laboratory sessions and take complete and careful notes.
3. conduct himself/herself in a safe and responsible manner in all laboratory sessions. **The decorum should approach that of a professional laboratory as regards demeanor and awareness.**
4. submit a lab report for each experiment following all instructions carefully.
5. take all scheduled quizzes and exams.

Grading standards:

The grading scale is as follows:

A = 90 – 100; B = 80 – 89: C = 70 – 79; D = 60 – 69; F = below 60

To obtain a grade of C students must do the following:

1. Complete each experiment in a safe and responsible manner while making measurements with reasonable accuracy and obtaining products in reasonable yields.
2. Demonstrate an understanding of the principles behind the laboratory experiments.
3. Demonstrate proficiency in the use of spectroscopy to identify organic compounds.

Grade analysis:

50% Lab Reports (One lab report score will be dropped.)
20% Homework Assignments and Quizzes (One homework or quiz will be dropped.)
20% Tests and Exams
10% Professionalism.

The Professionalism component of the grade is a score assigned by the professor to reflect the many things including but not limited to the student's attitude, work tactics, diligence, cooperativeness, and diligence. Deficiencies in conduct will be expressed in this student rating.

Laboratory reports are due at the beginning of the laboratory period on the due dates announced on the detailed Student Schedule for the course. Discussion of reports and lab performance with the instructor is possible in conference.

PROFICIENCIES:

Technology component:

The Anaszi Eft NMR Spectrometer is computer controlled. Students become certified as departmental users of the web based literature searching tool, STN Easy. They may use STN Easy for chemistry assignments until they graduate from HBU.

Designated essay/writing component:

Students must answer written questions on lab reports, quizzes, and exams.

Reading component:

Assignments are made from the text and supplementary materials.

Oral communication component:

Responses are expected during lecture and lab.

Mathematics component:

Students perform calculations for laboratory reports utilizing the stoichiometry of the laboratory reactions. Math is used in the analysis of spectra.

Critical thinking component:

Students apply knowledge gained in this course to new, related situations. Students think critically when they assign spectra to molecules.

LATE WORK & TEST POLICY

Late work:

For each weekday a lab report is late, 10 % of the possible points will be deducted from the grade. A lab report is considered late when it is not turned in on the due date at the beginning of class.

Missed tests:

Ordinarily, when a student misses an exam a grade of zero is given unless the student has permission from the professor to take a make up exam. If a catastrophe (death in the family, car accident, serious illness) prevents you from taking an exam, notify Dr. Woods *immediately (the day of the exam)* to discuss your situation. Documentation of

the reason for the absence may be required for permission to take a make-up exam. If Dr. Woods cannot be reached by phone, leave a message on my voice mail or send an email. Ordinarily, a student meriting a make up exam will only be permitted to take one make up exam per quarter. It is expected that students will take the make up exam within a few days of the missed exam.

What should I do if I miss a lab day?

1. First of all, do everything you can to avoid missing a lab day as **make up labs are not available.**
2. If it is a planned absence that you know about in advance, discuss it with the professor prior to the absence. Planned absences may involve interviews for health professions school, participation in University sponsored events, etc.
3. If it is unexpected and due to illness, send the professor an email the day of the missed lab to let the professor know what is going on with you.
4. All absences count as absences from lab no matter what the reason for the absence. There is no opportunity to make up a lab.
5. When a student misses a lab, the student does not complete or turn in the lab report for the day missed and earns a zero for that lab report. There is one dropped lab report grade in CHEM 3131/3132 and this zero will become a possibility for the one dropped.
6. Sometimes melting points and masses are completed on a lab day for the prior week's experiment. An absent student misses the opportunity to get the mass and melting point of their product. In that case, the student gets the mass and melting point on the lab day after their absence and then turns in the lab report for that experiment the week following that. Hence, in the case where an opportunity to obtain data is missed, an absent student is given extra time to complete a lab report.
7. If there is any homework due on the missed day, it should be turned in prior to a planned absence or immediately following an unplanned absence. Bring it to Dr. Woods in her office. In the case of an unplanned absence do not wait until the next lab period to turn in a homework that was due.
8. Late homework or late lab reports will not be accepted after the assignment has been graded by the professor and returned for discussion in class.

EVALUATION

Method of student appraisal of faculty:

Students will be given an opportunity to appraise the professor by completing the IDEA Faculty Evaluation Questionnaire, and/or the COSM course evaluation at the end of the semester. The instructor, the department chairman and dean will review the responses of the students after the completion of the course.

Method of evaluating student response to course:

Students will be given an opportunity to describe their response to the course by completing the IDEA Faculty Evaluation Questionnaire and/or the COSM course Evaluation at the end of the course. The instructor, the department chairman and dean will review the responses of the students after the completion of the course.

LABORATORY DRESS CODE

Students may be asked in advance to wear closed-toed shoes and long pants during certain experimental procedures.

Wearing Apparel:

For protection against spills, appropriate clothing must be worn in the lab. Students must wear shoes that cover their toes and heels. Flip flops and sandals are not acceptable. Students must wear slacks. Shorts and short skirts are not acceptable.

Safety Goggles:

Students must wear approved safety goggles in lab at all times. Students must purchase their own personal pair of goggles at the University Bookstore. Students without goggles in lab will receive one reminder from the professor on a given day. If the student is found to be without goggles a second time on the same day, the professor may dismiss the student from lab for that day and award a grade of zero on the report for the lab for that day.

LABORATORY CONDUCT AND SAFETY

IMPORTANT INFORMATION FOR THIS COURSE: IF A STUDENT IS PREGNANT OR NURSING, SHE WILL NOT BE ALLOWED TO ATTEND THE LABORATORY SESSIONS BECAUSE SOME THE CHEMICALS, WHICH ARE NORMALLY INNOCUOUS, USED IN THESE LABORATORY EXPERIMENTS, MAY BE HARMFUL TO A DEVELOPING FETUS. IF A STUDENT BECOMES PREGNANT DURING THE COURSE, SHE MUST NOTIFY HER PROFESSOR. THE PROFESSOR WILL DISCUSS OPTIONS THAT THE STUDENT WILL HAVE TO ENABLE HER TO COMPLETE THE COURSE REQUIREMENTS.

TOPICAL OUTLINE - ***include table, calendar, or topical outline with dates***

Laboratory Schedule:

A very detailed Student Schedule outlining the assignments, quiz dates, and exam dates will be passed out the first day of class and be available on Blackboard.

The following is a general schedule listing the topics to be covered. Each week, during the lab lecture time, the students will be prepared to conduct the experiment of the day and gradually will be introduced to the theory of NMR spectroscopy and its use in identifying organic compounds.

The content of this outline and the detailed Student Schedule are subject to change at the discretion of the professor.

Week 1	Safety lecture, laboratory check-in
Week 2	Searching the Chemical Literature: Orientation to STN Easy
Week 3	Melting point
Week 4	Distillation
Week 5	Recrystallization
Week 6	Extraction
Week 7	Natural Product Extraction
Week 8	Sublimation
Week 9	Thin Layer Chromatography (TLC)
Week 10	Chemical Reaction and Following it by TLC Analysis
Week 11	Column Chromatography Experiment One
Week 12	Column Chromatography Experiment Two
Week 13	Identification of an Unknown by Proton Magnetic Resonance Spectroscopy
Week 14	Synthesis of an Organic Compound; Analysis of a Product Mixture by NMR
Week 15	Laboratory Check Out
Final Exam Period	TBA

Student Work:

Work not returned to students is kept for one semester after the completion of the course.

Audiotaping:

Audiotaping of lectures for your personal use is permitted.

Lab Time:

Students should plan to be in lab during that entire time and avoid scheduling other things during that time.

Assignments:

All lab reports, homework assignments, and graphs must be *handwritten* by the student. Computer generated lab reports, homework assignments or graphs will not be accepted. Please write on one side of the paper only. Please present items in reports and assignments in the order they are listed on the handout describing the assignment. You may do your work in pencil if you prefer.

Some Reminders about acceptable graphs**:**

When preparing graphs, you must use graph paper of an appropriate size to meaningfully display your data. The graph should have a title and each axis should be labeled. The labels should include the appropriate units describing the data being graphed. *The lab report grade will be deducted for unacceptable graphs.* Remember that most of the time data has experimental error in it and so does not lie exactly on the expected straight line or smooth curve. In those cases, a scientist plots the data points and circles each one. Then the best straight line is drawn with a ruler or the best smooth curve is drawn as suggested by the data. The data may or may not actually lie on this line or smooth curve. Scientists do not connect data in a dot-to-dot manner in these cases.

Be sure to have your HBU Student ID with you at all times during the course

The content of this outline and the attached schedule are subject to change at the discretion of the professor.

Student Signature – I have read and understand the syllabus for this class. I understand that the content of this syllabus and the topical outline are subject to change at the discretion of the professor. I have read and understand the HBU Classroom Policy posted on Black Board. **I promise to uphold the Code of Academic Integrity at Houston Baptist University and will not tolerate its violation by others**.