IONA

School of Arts & Science

Organic Chemistry Laboratory **Department of Chemistry**
CHM 220 LB **Fall 2010**
Meeting W 2:00-5:52 PM
Cornelia Hall C-205

Instructor: Dr. Terrence Gavin
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Office hours M W 1:00-1:52 PM; T 12:00-12:52 PM

Course Description:
Through experimentation the Organic Chemistry Laboratory validates the theory of structure and reactivity that is presented in the lecture course (CHM 209-210). 2 *credits*.
Prerequisite: CHM 109-110 General Chemistry
Scheduled Every Fall Semester and Every Spring Semester

Required Texts/Source Materials/Readings and References:

Kenneth Williamson, Macroscale and Microscale Organic Experiments, 6th Edition: Houghton Mifflin, Boston MA (2010).

Introduction
The goal of this course is to introduce students to the techniques of modern experimental organic chemistry in order to enhance their understanding of molecular structure and reactivity. In addition to distillation, extraction and crystallization, techniques include vapor and liquid phase chromatography as well as FTIR, FT NMR and UV-Visible spectroscopy. The course is required for all Chemistry, Biochemistry and Biology majors and any student interested in medical/dental pre-professional training.

Learning Goals/Objectives: *Chemistry Core Learning Goals*
S1 Develop the habits and skills of critical thinking;
S2 Develop student-centered, inquiry based learning environment;
S3 Instill an appreciation of the role of science in today's world;
S4 Prepare students to become lifelong learners and decision makers adaptable to new information technologies;
S5 Provide the critical background required for mastery in a particular scientific discipline;
S6 Prepare students to enter career positions in industry, to pursue graduate studies, to enter professional schools, to teach science;
S7 To bring students to an understanding of the nature of scientific knowledge and appropriate application of scientific concepts, principles, laws and theories;
S8 Enable students to utilize the process of science in solving problems, making decisions and furthering their understanding of nature and technology;
S9 Provide students with an understanding and appreciation of the joint enterprises of science and technology, practical applications of science and the interrelationship between science and society;
S10 Facilitate processes which enable students to communicate scientific concepts in a logical fashion.

Student Responsibilities

i. **Obey all safety rules** in the laboratory and obtain a passing grade on the **safety quiz**.
ii. Complete Experiments 1 and 2 plus a minimum of 10 experiments from the listing 3-16 (some may require more than one laboratory period) stipulated by the Instructor.
iii. Record the data and all other relevant material from experimental work in a bound laboratory notebook with numbered and dated pages that contains a Table of Contents.
iv. Write an accurate description of each experiment in the laboratory notebook.
v. Submit a minimum of three laboratory reports (Stipulated by the Instructor).

Assessment Criteria

Grading

Quizzes (Including Safety Quiz)	10%	90% = A
Laboratory Notebook	50%	86-89% = B+
Laboratory Reports	30%	80-85 % = B
Laboratory Technique	10%	75-79% = C+
		70-74% = C
		60-69% = D
		Below 60% = F

Students are required to complete all assigned experiments. Ordinarily, a student who misses an experiment will be given a grade of 50 for that experiment. A student who misses more than two experiments may be given an **FA in the course**. Students who complete an experiment but fail to write a description in their notebook will receive a grade of 65. Students who fail to submit an assigned laboratory report in a timely fashion will be given a grade of 75 (lowered if the notebook description is inadequate).

Tools

Achievement of the stated learning goals requires the student to read the textbook in preparation for the laboratory session, to perform the experiments in a safe and inquisitive fashion and to compile a record of experimental data, observations, techniques and achievements. Students are required to participate in all aspects of each laboratory session by following safety rules, bringing the textbook and their laboratory notebook to the lab, recording appropriate data and observations, asking questions and making comments as requested by the instructor or as appropriate to the situation.

Experiments (Tentative)

1. Building Lewis Structure/ Exploring Dynamic Chemical Processes/ Introduction to Computational Chemistry (using SPARTAN software).
2. Safety and Waste Disposal in the Laboratory/ Check In/ Coordination of Physical Properties with Structural Theory- Melting Point Determinations/ Structural Computations Using SPARTAN.
3. Safety Quiz/ Determination of Acidity Constants for Organic Acids- Solvent and Substituent Effects/ Computation of Acid Strength.
4. Extraction of Caffeine from Tea/ Recrystallization/ Preparation of Caffeine Salicylate.
5. Thin Layer Chromatography- Analgesics
6. Distillation: Ethanol/Water Simple and Fractional- composition determination after simple distillation of a 20% mixture.

7. Analysis of a Mixture by Gas Chromatography/ Mass Spectroscopy/ Preparation of Alkenes from Alcohols- Methylcyclohexene.
8. Isolation of a Natural Product by Steam Distillation- Clove Oil/ Acid Base Extraction of Eugenol/ Analysis by GC/MS, FTIR and ^{13}C NMR Spectroscopy.
9. Preparation of n-Butyl Bromide/ Purification by Distillation/ NMR Spectroscopy.
10. NMR Spectroscopy- ^{1}H and ^{13}C NMR of C_4H_{10} Isomers/ DEPT Spectra.
11. Spectroscopic Analysis of Unknown Ketones and Aldehydes/ Derivative Preparation.
12. Using Computational Chemistry to Predict Stereochemical Outcomes/ Aldol Condensation/ Analysis by NMR.
13. Esterification and Hydrolysis- Preparation of Methyl Benzoate, Saponification of Fats and Oils.
14. Quantitative Assessment of Aromaticity by Computation/ Reactions of Aromatic Compounds/ Electrophilic Aromatic Substitution/ Nitration.
15. UV-Visible Spectroscopy/ Preparation of a Heterocyclic Compound- Aryl Quinoxalines.
16. Measurement of Reaction Rate via NMR/ Grignard Synthesis of Alcohols and Diols/ Esterification with TFA/ Check Out.

College Policy for all courses and students: (full explanations of policy may be found in the College Catalog)

Plagiarism: Is the unauthorized use or close imitation of the language and thoughts of another author/person and the representation of them as one's own original work. Iona College policy stipulates that students may be failed for the assignment or course, with no option for resubmission or re-grading of said assignment. A second instance of plagiarism may result in dismissal from the College.

Attendance: All students are required to attend all classes. Iona has an attendance policy for which all students are accountable. While class absence may be explained it is never excused. Professors may weigh class absence in the class grade as they see fit. Failure to attend class may result in a failure of the class for attendance (FA), when the student has missed 20% or more of the total class meetings. The FA grade weighs as an F would in the final official transcript.

Course and Teacher Evaluation (CTE): Iona College now uses an on-line CTE system. This system is administered by an outside company and all of the data is collected confidentially. No student name or information will be linked to any feedback received by the instructor. The information collected will be compiled in aggregate form by the agency and distributed back to the Iona administration and faculty, with select information made available to students who complete the CTE. Your feedback in this process is an essential part of improving our course offerings and instructional effectiveness. We want and value your point of view.*

NOTE* You will receive several emails at your Iona email account about how and when the CTE will be administered with instructions how to proceed.