

CHM 244: Organic Chemistry Lab
Syllabus– Summer 2016

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Lab: Monday, Tuesday & Thursday 12:45-3:35 pm, 279 Hughes, see dates below.

Required Materials: Safety Goggles, Lab Notebook, Lab Manual (M. Novak, S. A. Hershberger, K. Rush-Galloway, **Organic Chemistry Laboratory Manual**, 2015). (All experiments are referred to this manual unless a handout is provided).

Periodic readings may be necessary from CHM 241 Textbook (David Klein's "Organic Chemistry" 1st or second edition).

Safety Regulations: No food or drinks are allowed in the lab. Everyone must wear safety goggles to protect one's eyes and long pants, shirts with sleeves and closed toed shoes to protect body skins from contact with chemicals.

Co-requisite: CHM 241 Lectures

Date	Week	Topics	Experiments
5/17	1	Check in, safety quiz	Buy safety goggles
5/19	1	Models in chemistry	Expt. 1: Molecular Models/ChemDraw pp. 25
5/23	2	Extraction	Summary Report on Expt. 1 due (20 points) Expt. 2: Extraction/ Extra Strength Excedrin pp.33
5/24	2	Recrystallization	Summary Report on Expt. 2 due (20 points)

			Expt. 3: Recrystallization/melting point	pp.43
5/26	2	Catch up		
5/30	3	Memorial Day	No lab	
5/31	3	Thin Layer Chromatography	Summary Report on Expt. 3 due (20 points)	
			Expt. 4: Thin Layer Chromatography (TLC)	pp.51
6/2	3	Infrared (IR) spectroscopy	Summary Report on Expt. 4 due (20 points)	
			Expt. 5: IR Spectroscopy	pp. 63
6/6	4	Column chromatography	Expt. 6: Separation of fluorine/-one	handout
6/7	4	Finish up	Summary Report on Expt. 5 due (20 points)	
6/9	4	S _N 2 reaction	Summary Report on Expt. 6 due (20 points)	
			Expt. 7: S _N 2 reaction	pp. 101
6/13	5	S _N 1 reaction	Continuation of Expt. 7	
			Expt. 8 : S _N 1 reaction/Retinoids	
6/14	5	continued	Summary Report on Expt. 7 due (40 points)	
			and finish Expt. 8	
6/16	5	Finish up	Summary Report on Expt. 8 due (40 points)	
6/20	6	Synthesis I	Synthesis I, TBA, handout,	
6/21	6	Synthesis II	continuation of synthesis I (40 points)	
6/23	6	Finish report, check out	Check-out, Summary report due on Synthesis	

Grading

CHM 244 will be graded based on a maximum of 340 points. A breakdown of the points is included below.

Date	Quizzes	Web quiz	Notebook & Report
5/17	lab safety (5 pts)	5 pts	none
5/19	Making models (5 pts)	5 pts	20 points
5/23	Extraction (5 pts)	5 pts	20 points
5/24	Recrystallization (5 pts)	5 pts	20 points
5/31	TLC (5 pts)	5 pts	20 points
6/2	Infrared (IR) spectroscopy (5 pts)	5 pts	20 points
6/6	Column chromatography (5 pts)	5 pts	20 points
6/13	S _N 2 reaction (5 pts)	5 pts	40 points
6/14	S _N 1 reaction (5 pts)	5 pts	40 points
6/20	Synthesis	5 pts	40 points

Quizzes	100 (10 x 10)
Lab Write ups	<u>240 (6 x 20 + 40 x 3)</u>
TOTAL	340

Approximate cutoffs: A ≥ 90% B ≥ 80% C ≥ 70%

Course Objectives:

There are a number of important skills that you must learn to be successful in any scientific endeavor. The laboratory situation is an ideal environment to teach many of these skills. The assignments and resources made available in this course are meant to advance your ability:

1. to formulate and maintain a laboratory notebook.
2. to write laboratory reports based on interpretation of experimental results.
3. to use appropriate software and websites to interpret results, enhance reports, visualize chemical structures, and search the chemical literature.
4. to communicate effectively in oral and written form, individually and as part of a group.
5. to follow written and oral directions for designing and carrying out experimental work.
6. to learn spectroscopy methods and to learn how to utilize spectroscopic information to solve structural and mechanistic problems (TLC, IR, NMR).
7. to carry out organic reactions in a safe and environmentally sound fashion.

These course objectives will not be reached in one semester. You will continue to work on these objectives in the second semester laboratory course, CHM 245, and many of these objectives will be part of additional courses and training you will receive throughout your undergraduate career.

Attendance and Preparation:

Summer courses are extremely compact. You must make every effort not to miss any laboratory experiment because there is no time for making up a missed lab. The laboratory work schedule is demanding. You will be part of a group project this summer and you will be sharing data with a lab partners or with the class in several experiments: inability to meet your obligations in these situations will be reflected in your grade. You are expected to perform pre-lab reading assignments and notebook preparation prior to coming to lab: **read lab manual and listen to podcast before taking quizzes.**

Notebooks:

For each experiment you are expected to maintain a notebook entry, and much of the work must be completed **before** coming to lab. For each experiment you must have the following materials prepared before coming to lab:

1. a descriptive **Title**
2. a short **Introduction** that includes the major purposes of the experiment.
3. a **Preliminary Data** section that includes a table of chemicals to be used with molecular weights and physical data (melting points, boiling points, density, etc.) for all materials for which this information is needed, and balanced chemical equations for the reactions to be carried out. Not all experiments will involve a reaction, so do not write one if no reaction takes place!
4. a **Procedure** section that outlines the procedures to be followed. Do not copy the lab manual procedure, summarize it in your own words and leave space for entries you will need to make as the lab is performed (weights, % yields, melting points, observations of color, precipitates, etc.). Take note of any procedural changes/additions given in the handouts for each experiment or that become necessary during the course of the experiment, and make sure those changes are reflected in your notebook entries.

May 2016						
Sun	Mon	Tue	Wed	Thu	Fri	Sat
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17 Class begins Check in	18	19 Quiz 1 (241) Models building	20	21
22	23 Extraction	24 Melting Point	25 Quiz 2 (241)	26 Catch-up	27	28
29	30 Memorial Day, No class.	31 TLC	Notes:			

June 2016						
Sun	Mon	Tue	Wed	Thu	Fri	Sat
			1 Quiz 3 (241)	2 IR	3	4
5	6 Column chromatography	7 Midterm (241) Finish up	8	9 SN2 reaction	10	11
12	13 Quiz 4 (241) SN2/SN1 reactions	14 SN1 reaction	15	16 Quiz 5 (241) Finish up	17	18
19	20 Synthesis I	21 Synthesis II	22 Quiz 6 (241)	23 Final Exam (241) Finish up and check out	24	25
26	27	28	29	30	Notes:	