University of Rhode Island; Department of Chemistry
CHM 226: Organic Chemistry Laboratory - REVISED
Odd Section Numbers – Beaupre 245
Even Section Numbers – Beaupre 260

Course Instructor	Prof. Matt Kiesewetter 325C Beaupre mkiesewetter@uri.edu
Office Hours	By appointment.
Textbook/Materials	A carbon copy laboratory notebook must be used to record all data. Experimental procedures and supplemental information will be provided to you via Sakai, but the textbook for the accompanying lecture course (CHM 227/228) may be useful for preparing laboratory reports. Safety goggles/glasses, lab coat, nitrile gloves. RAM account and card to purchase items in the chemistry stockroom. A calculator that is not capable of accessing the internet. The calculator app on smartphones/tablets/etc may NOT be used. MNova and Chemdraw software (free downloads though URI Chemistry). Access to the internet. **You are responsible for checking the Sakai site, coming to lab prepared to conduct the right experiment and checking your URI email regularly.**
Course Goals	CHM 226 is an introduction to conducting organic research. The ultimate goal of the course is to provide students a basis by which they will be able to conduct a chemical reaction that they have never performed before. The 'real world' of organic chemistry involves performing reactions and making compounds that are unknown. The virtually-unlimited diversity of chemical structure originates at the fountainhead of a handful of lab and analytical techniques. By conducting specific named reactions and targeted technique instruction, this course will introduce students to a variety of skills that they may implement in their professional development and careers. You are about to embark on one of the most empowering courses in the undergraduate curriculum after which you will have the tools required to synthesize almost any chemical compound, including those that are unknown to human kind. Also, this material is on the MCAT.
Course Grade	Evaluations are directly related to work performed in lab, and attendance is required. There are no makeup labs. All graded work should be performed individually. Student grades will be based on evaluations on each experiment (100 points each). The lowest grade will automatically be dropped. Course letter grades will be determined by this scale (%): >95 A; >90 A-; >87 B+; >84 B; >80 B-; >77 C+; >74 C; >70 C-; >60 D. **There is no curve in this course, and no extra credit will be offered.**
Grading	Students will receive a grade for each experiment (100 points per experiment) and criteria that will be evaluated for each experiment is given below. For most experiments, the grade will be determined as described here: **Experiment Evaluations (100 pts each)** 1. *In-class quiz* (50 pts): There will be an in-class quiz associated with each experiment. On the quiz, students are allowed to use a calculator and their laboratory notebook.

Any question relevant to an experiment is fair game (e.g. mechanism, reaction setup, technique, data analysis). Post laboratory questions in each experiment are a good check of comprehension. Any missed/missing quiz will be scored as zero.

2. *Lab notebook and data analysis* (40 pts): *Lab notebook* copy pages and data are handed in with the quiz, and entries are made according to the guidelines. *Data analysis* should be performed for relevant data (including spectra) with entries provided in table or list form, assigned and analyzed. Note, that not all experiments have data analysis. Students should arrive at the quiz with notebook pages and data analysis ready to hand in.
3. *Lab technique/citizenship* (10 pts). While points given to other sections of the evaluations will vary depending on the experiment, lab technique/citizenship will always be 10% of the points.

The in-class quiz portion of the evaluation will not be returned to the student; however, students will be given an opportunity to review their in-class quiz.

Lab technique and citizenship are important parts of safely conducting chemistry experiments in a shared space, and each experiment includes 10 points for technique/citizenship. Individuals and groups of students will receive a demerit for exhibiting poor technique and/or citizenship. Each infraction will be documented and will result in the loss of 5 points minimum from that experiment. Serious infractions (e.g. removing safety glasses or lab coat) will result in the loss of all 10 points of technique for an experiment, and repeated infractions will result in loss of additional points (beyond the allotted 10 points) and possible dismissal from the course. Non-attributable violations will result in point deduction from the entire section (e.g. untidy waste/dispensing area, minus 5-10 points from everyone).

Other examples:

1. Students engage in unsafe practices including horseplay, no safety glasses, no lab coat, etc (minus 10 points).
2. Students maintain an untidy work space (including the chemical weighing and dispensing area) and do not return the lab to its starting condition. (minus 5-10 points)
3. Students place outside-lab devices (e.g. cellphones) on the lab bench. (minus 5 points)
4. Students fail to follow the lab safety policies. (minus 5-10 points)
5. Students placing lab note books inside the fume hood while experiments are performed (minus 5 points)
6. Students using mobile phones during lab sessions with gloves (minus 5 points)
7. Being late to lab; important safety information is discussed at the beginning of the lab period. (<2 min late, minus 5 points; 2-10 min late, minus 10 points)

No makeup labs are given for any reason.

Regrading: Students may request a re-grade on any evaluation for up to 1 week from when the evaluations are made available for review. Requests for regrades must 1) be made in writing and 2) clearly state the issue/point being disputed. The whole assignment is subject to regrading. Any assignment performed in pencil will not be regraded.

Students are not allowed to use or have in their line of site a calculator/computer that is able to accesses the internet. Simply having a cellphone (e.g.) in their line of site will result in a zero for a quiz.

Plagiarism	Cheating or plagiarism on a graded assignment will result in a zero for that evaluation and referral to the Dean and possible failure of the course. Students are expected to follow the University policy of ACADEMIC HONESTY and all other University policies.
Cancellations	In the event that classes are cancelled (e.g. snow day), an experiment may be deleted from the schedule. For grading purposes, do not count on being able to complete all laboratory experiments. If classes are cancelled on a quiz day, the quiz day will be rescheduled to the day immediately following the restoration of university activities. The laboratory schedule is subject to change in the event of emergencies, cancellations, etc, and it is the responsibility of all students to be present for all scheduled lab sessions.
Absenteeism	This is a laboratory course; there is no substitution for a missed lab. If a student must be absent for any reason, the missed experiment will be counted as their dropped grade. Further absences resulting in a missed experiment will result in a grade of zero for that experiment. Students that miss more than 2 experiments will be advised to drop the course. If a student misses one day of a multiple day experiment, they should not expect to be able to finish the experiment in the other day(s). Excused absences must be cleared by Prof Kiesewetter 2 weeks in advance, minimum. *Students will not be admitted to the lab if they are 10 minutes late to lab*; important safety information is discussed at the beginning of the lab period. That experiment will be scored as a zero.
Equipment	Students are responsible for the equipment in the drawer assigned to them on the first day of class. Any broken equipment must be replaced at the student's expense, this includes any shared/departmental equipment. Any student who has an unpaid bill with the chemistry stockroom will have a hold placed on their account which will prevent the student from registering in the future. Drawers must be checked out at the end of the semester or if a student chooses to drop the course. Improper or missed checkout may result in a charges from the stockroom and a hold on the student's account.

Experiment List and Evaluation Criteria - REVISED

		Grading Criteria				
		Post-lab questions	Quiz	Notebook	Analysis	Citizenship
1	ChemDraw, ACS Publications, SciFinder	X				X
2	General Techniques		X	X	X	X
3	Distillation		X	X	X	X
4	NMR Lab		X			X
5	Diels-Alder Reaction		X	X	X	X
6	Recrystallization Techniques		X	X		X
7	Chromatography		X	X		X
8	Suzuki		X	X	X	X
9	Reducing Benzil		X	X	X	X
~~10~~	~~Wittig~~		~~X~~	~~X~~	~~X~~	~~X~~
11	Zyban Synthesis		X	X	X	X
~~12~~	~~Indigo Synthesis~~		~~X~~	~~X~~		~~X~~

Experiment Schedule - Schedule may be revised in the event of class cancellations or other unforeseen events (no kidding, right?).

week	day	All Sections
1/20	W	No lab
	R/F	Check-in and course policies
1/27	T/W	1-ChemDraw, ACS Pubs, SciFinder
	R/F	2-General Techniques
2/3	T/W	3-Distillation
	R/F	4-NMR lab (2 day lab)
2/10	T/W	4-NMR lab
	R/F	**Quiz over labs 2 and 3**
2/17	all	5-Diels-Alder (2 day lab)
2/24	T/W	6-Recrystallization Techniques
	R/F	**Quiz over labs 4 and 5**
3/2	all	7-Chromatography (2 day lab)
3/16	all	CLASSES CANCELLED
3/23	Mon	Problems sets for labs 6 and 7 **distributed via Sakai**
	Wed	Problems sets for labs 6 and 7 **DUE**
3/30	all	No assignments due (focus on your other courses)
4/6	all	Benzil lab (classes resume) -OR- Zyban data analysis (online classes)
4/13	all	Suzuki lab (classes resume) -OR- Suzuki data analysis (online classes)
4/20	T/W	Check-out day (classes resume)
	R/F	**Quiz over labs 8 and 9** (classes resume)

T = Tuesday; W = Wednesday; R= Thursday; F = Friday

University Schedule

Feb 13 – Last day to drop class w/o designation
March 4 – Last day to drop a class
March 9-15 – Spring Break (no class)

Keeping a Laboratory Notebook

Students must acquire a carbon copy laboratory notebook and maintain it according to the rules below. Students will be required to hand in a copy of their lab book entries for each experiment; hand in all pages. These copies should be affixed to the lab report. In short, a lab notebook should contain enough information that a person 'skilled in the art' could reproduce your experiments. Students need to arrive at lab ready to listen to safety/lab discussion and/or perform experimentation. If a student arrives with an empty lab notebook (i.e. is not ready to start the experiment) they may be asked to leave the lab.

An example lab page is on Sakai.

Before coming to lab:

1. Name the experiment.
2. Write down a purpose or hypothesis statement. It can be difficult to remember why you did something 6 months after you do it.
3. Place a chemical drawing of the reaction being performed at the beginning of the entry, if applicable.
4. For each reagent used, clearly give 1) the desired amount; 2) the amount used in grams/mL/etc; 3) (m)mol; and 4) (m)M; 5) formula weight and density (if applicable). These data will help as you go to write up experiments and helps trace errors later.
5. Write down a **condensed** procedure or flow chart for the lab. There is no point in copying a procedure (nearly) verbatim, so give yourself a severely shortened version of the actions you need to perform; you can always refer back to the experimental.

During/after each experiment and in general:

1. Give a short synopsis of the experimental procedure and reference any literature that you are following (this can often be done before lab as well). Update your notebook with observations.
2. Errors should be crossed out with a single line and the new entry provided above/beside
3. Each experiment should receive its own page (or more than one page).
4. All spectra/data should be numbered (physically on the paper) and saved to the spectrometer/instrument so that they reference a specific notebook page. The sample should be numbered in the same format. Use the format: 'your initials'-'notebook number'-'page number' (ex. MK-1-19). The type of data collected and what was analyzed should be clearly labeled in the notebook.
5. Multiple analyses should be given letters. Example: If MK-1-19 is the crude material, the purified material could be called MK-1-19b. Consider giving complicated purifications their own notebook page/experiment.
6. Cross reference your pages, if applicable. For experiments that use more than one page, clearly label at the bottom of the first page where the second page starts (it may not always be on the next page).
7. Date your entries.
8. Calculate yield and give brief conclusions. Think about it as giving yourself pointers for 'next time' you do that reaction. Eg. "My yield may have been low because I […]. Next time I would […]."