Chemistry 301  
Laboratory in Chemical Structure and Reactivity  
Fall 2017 – 2nd Quarter Tu/Th

Instructor:
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Teaching Assistants:
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Meeting Times:
Lecture: Tuesday and Thursday 11:30 am - 12:30 pm (KINSC L205)  
Lab: Tuesday and Thursday 1:00 pm - 4:00 pm (KINSC E108)

Office Hours:
By appointment (I do really want to meet with you, but my schedule is flexible so please call/text/email me to set a time to meet!)

Moodle:
There is a Moodle site for this course at http://moodle.haverford.edu/. All materials related to Superlab will be posted on Moodle.

Recommended Texts: (You do NOT need to buy 1 and 2 below! Check the library ☺)


3. Laboratory Notebook (electronic is required; paper is optional)

Superlab Goals:
Superlab is a course designed for Chemistry majors (and Biochemistry concentrators), and one of the major goals of Superlab is to prepare you to be an independent chemical researcher. That is, you will be expected to read and understand the chemical literature, plan out experiments, run rather involved reactions, problem-solve, use research grade instrumentation, interpret data, and communicate findings.

During the quarter you will be paired with a partner to complete the synthesis of targets that will be submitted for testing against the visceral leishmaniasis parasite, L. donovani! You will be part of an ongoing research collaboration with other laboratories around the world (Drugs for Neglected Diseases Initiative – DNDi), and the collaboration is open source! Your successes in
lab and the findings of others in the collaboration will be available for viewing around the world, and this means your community of colleagues is even larger than Superlab. We also may have the opportunity to publish your work – depending on our progress.

You will be expected to work independently and within your group and think critically about the chemistry involved. (Discussion with peers and the instructor is strongly encouraged … and actually essential). As in a typical research lab, you will be expected to read the literature before working in the laboratory, follow the experimental procedures presented in the literature papers, conduct the experiments, interpret the results, work to solve problems that arise, and write up your findings. You will be providing all of your spectra and writing up all of your procedures and data in the form used in the *Journal of Medicinal Chemistry*.

**For day 2, 11/2/17, please complete the readings below:**

**Safety in the Laboratory:**
Please read Chapter 2 (pp. 3-7) in Leonard, Lygo, and Proctor, *Advanced Practical Organic Chemistry* (please see Moodle page) where you will find a review of the general safety rules and practices for laboratory work. There will also be a safety orientation during the first pre-lab meeting (Thursday, November 2nd).

Safety unquestionably is our most important concern. **You must have Rob’s permission before performing ANY reaction, and Rob will need to see your scheme and all completed calculations, data tables, etc.** Never, under any circumstances, work alone in the lab. Always wear safety goggles/glasses (I wear goggles!), disposable gloves, and laboratory coats. Hopefully, most of your laboratory experiments will be conducted during the designated time (Tues/Thurs 1 pm - 4 pm), but there may be some instances when you have to come back to lab at another time, for example to check on a reaction, to turn off a heater, to add a reagent, take a TLC. You can have access to the laboratory outside the scheduled lab time (please see Kumbu in the KINSC office for a key), but make sure that someone is with you. *Again, it is vital that you never work alone. If you absolutely need to go into lab and can’t find a partner, call/text me and I’ll do my best to get in there (please give me as much notice as possible though)!*

**The Laboratory Notebook:**
Read Chapter 3 (pp. 8-35) in Leonard, Lygo, and Proctor, *Advanced Practical Organic Chemistry* about keeping a laboratory notebook (again, see Moodle). The information in the chapter is meant for chemists who work in an organic chemistry research lab, but it is also useful for other types of experimental chemistry. There is even detailed information about how to write lab reports!

I would like you to use some type of electronic notebook in this course. You may record information in a paper notebook during lab to be transferred subsequently to your electronic notebook unless you wish to bring a laptop to lab (make sure you don’t touch it with contaminated hands, place on contaminated benchtop, spill solvent on it, etc.!). **ALL of your notes and observations should be recorded in the notebook.** Maintaining a detailed and accurate description of your experimental work is *absolutely essential*, and particularly crucial for preparing your laboratory reports and publication. Remember, your notebook is the *only account* of what you did in the lab and how you performed the experiment. You should record information in your notebook while your experiment is occurring. You also should include all of
your spectra and calculations in the notebook. You (or another similarly trained chemist) should be able to open your notebook at any time, to any entry, and – from the description you have written – repeat a given procedure or analysis with the same result.

For your final assignment you will be submitting all of your spectra and your procedures and data in *J. Med. Chem.* format! I will talk about this in lecture.

**Collaboration:**
You will be working in pairs this quarter. Sometimes you will be working on reactions independently, and sometimes you will be working directly with your partner. You will very likely also consult with other groups working on similar reactions or intermediates! In either case, we strongly recommend close interactions with each other. If you discover a problem while performing your experiment, share it with your colleagues so that they do not make the same mistake. If you stumble upon a very cool trick for a lab technique or a useful paper from the literature, share it with your colleagues. This is the joy of doing chemistry: talking to each other, having fun, and learning from each other. If your Superlab experience isn’t challenging AND fun, please talk to me!

**Schedule and Assignment due dates***:

*LOOK CAREFULLY AT ALL DUE DATES BELOW!*

**Week 1:**
Oct. 31**th**: Lecture: Introduction to the course and targets; No Lab
Nov. 2**nd**: Lecture: Safety, ELN (electronic lab notebook), Procedures/Data Section, SciFinder, anhydrous reagent handling, discussions of target syntheses – time permitting; Lab: drawer check-out, NMR training – Rob will update you on 11/2/17
**DUE**: 11/2/17 in class (don’t hand anything in, just please have completed): 1) do readings on page 2 of syllabus, 2) study NMR, etc. resources on Moodle!

**Week 2:**
*Tentative* -- Ben Perry of DNDi may speak via Skype from Switzerland this week – Rob will update you ASAP
Nov. 7**th**: Lecture: Medicinal Chemistry, continuation of synthesis – rationale; Lab: synthesis of targets
**DUE**: 11/7/17 in class (don’t hand anything in, just please have completed): proposed synthetic plan for target Rob introduced 11/2/17
Nov. 9**th**: Lecture: Medicinal Chemistry; Lab: synthesis of targets

**Week 3:**
Nov. 14**th**:
*Confirmed* -- Tamsin Mansley/Optibrium in-person from Boston, MA
11:30 am – 12:30 pm -- StarDrop overview (KINSC L205)
12:30 pm – 1:15 pm -- Lunch (Students at DC, Rob get lunch for Tamsin at Coop)
1:15 pm to 4 pm – Introductory hands-on StarDrop training workshop (KINSC E309)
**DUE 11/14/17**: Next steps synthesis proposal – Rob will explain on 11/7/17!

Nov. 16**th**: Lecture: Medicinal Chemistry; Lab: synthesis of targets
Week 4:
Nov. 21st: Lecture: Med Chem; Lab: synthesis of targets

Week 5:
Nov. 28th: Lecture: Med Chem; Lab: synthesis of targets
Nov. 30th: Lecture: Tamsin’s follow-up on StarDrop presentation via Skype; Lab: synthesis of targets

Week 6:
Dec. 5th, 7th: Lab: synthesis of targets

Week 7:
Dec. 12th, 14th: Lab: synthesis of targets

Week 8:
DUE: 12/22/17 11:59 am final versions of ELN, Procedures/Data/summarized spectral, etc. data
Section in J. Med. Chem. format
DUE: 12/22/17 11:59 am Case Study Assignment

*Note: Additional assignments may be made for interactive group work during lecture 😊

Grading:
Your grade for this quarter will be based on a score with the following weighting:
Electronic notebook 25% (group/indiv. lab perf.)
(includes laboratory performance)
Final procedures suitable for publication 25% (indiv)
Final data suitable for publication 25% (indiv)
11/14 synthesis assignment 15% (group)
12/22 Case Study assignment 10% (group)

Lab Cleanup:
It is absolutely essential that we all work together to keep the lab clean! You must clean-as-you-go and also check to be sure your hoods and all work spaces are clean before you leave. Remember, we are sharing the lab with our section colleagues AND another Superlab section. This is also a safety issue; if you leave a mess on a balance or elsewhere, the person following you may have no idea what the chemical is!
Important Note: This syllabus is subject to change at the discretion of Rob Broadrup.