Advanced Synthesis Lab (CHEM 4913L)
Spring 2020

Instructor: Dr. Partha Ray
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Office Hours:
MW 1-2:30 & 5:30-6, TR 5-6, F 2-6

Instructor: Dr. Megumi Fujita
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Office Hours:
MWF10-12, TR1-3

Laboratory Schedule: Mondays and Wednesdays, 2:30pm-5:30pm

Classroom: TLC 3104 (Advanced Lab)

Prerequisite: CHEM3422 with a minimum grade of C and CHEM4610 (may be taken concurrently).

Learning Outcomes: Demonstrate knowledge and techniques of synthesis and spectroscopic characterization. Apply technical writing skills to interpret experimental results, express findings and derive meaningful conclusions.

Description: Involves non-trivial synthesis, separation, purification, and characterization of organic and inorganic compounds by a variety of techniques. Spectroscopic (NMR, IR, UV, etc) will be used to characterize the properties of the synthesized molecules. Special emphasis will be placed on writing skills and key software usage (ChemDraw, MestReNova). For one project, there will be an oral presentation.

Course Material:

- Permanent Bound Laboratory Notebook (not spiral-bound)
- Safety Glasses must be worn at all times in the laboratory and can be purchased from the Chemistry Department.

Tardiness / Missed Lab: Lab attendance is mandatory. At the beginning of each laboratory we will discuss theory and principles related to the laboratory. Lateness will be penalized by deduction of points from your lab report. Do not leave the lab early unless your task is completed. You will earn the grade of zero for any missed lab.

Policies: Read all laboratory material before coming to lab. You are responsible for the cleanliness of the laboratory. You must clean all apparatus at the end of each experiment and return to your designated drawer. Borrowed equipment or chemicals should be returned by the end of each lab. All chemical waste should be disposed properly. Special care should be made to keep the area around the balances free of spills.

Safety goggles and closed-toe shoes must be worn at all time during lab activities.

Apparatus: After checking in, you will be responsible for maintaining all apparatus in the designated drawer. Make sure that your drawer is complete at the end of each lab day. **Grade will not be given if you do not properly check out.**

Academic Misconduct: Honesty in reporting results is one of the essential characteristics of your laboratory work. You will be more severely penalized for misrepresenting results than for honestly reporting "poor" results. Copying any part of journal articles, books, or website without proper citation are considered academic misconduct and will be penalized to the fullest extent possible**. Do not copy any part of other people's lab reports, including your lab partner's (this applies to all parts of reports, including contents, figures and tables). Even if you worked with a lab partner, you must write your report individually.**

Discipline-Specific Writing: This course is designated as a Discipline-Specific Writing (DSW) course. The writing components of this course are essential part of this course and are designed to train you in scientific writing. This will entail writing in your laboratory notebook and laboratory reports. Your laboratory notebook will be a place for planning, calculation, procedure and record of all raw data and observation. Detailed instruction will be given in class. Your laboratory reports must follow appropriate scientific writing format and some may require several rewrites to improve your writing of scientific papers. See attached guideline for the format.

Grades

Lab Notebook (written entries of all experiments)	15%
Lab Reports	85%
Oral presentation	5%

Grading Scale: 90-100 A, 80-89 B, 70-79 C, 60-69 D, <59 F

Lab Notebook

You are expected to keep an up-to-date hand-written original record of all experiments you perform. All records must be entered directly into the notebook in non-erasable ink. **The notebook must be up to date all the time. Make all entries on the same day of the experiment and as you perform the experiment.** See the separate laboratory notebook instruction.

The prelab preparation of the notebook includes the date, title, reaction scheme and mechanism, properties and calculations (formula mass, density, melting/boiling points, moles, mole ratio, theoretical yield etc), prelab homework (if required) etc. See a separate handout for more details.

As you carry out your experiments, you will record the procedure that you actually performed (written in the past tense and in the third person), observation, physical data (e.g. melting point) and types of spectra collected (e.g. ^{1}H NMR in DMSO-d_6). The spectra themselves will most likely be attached to your reports, so they do not have to be included in the notebook. See a separate handout for more details.

The lab notebook may be checked for grading during the semester without prior announcement. Your lab notebook needs to stay up to date all the time. The lab notebook will be collected at the end of the semester.

Reports

You will be given a basic outline of each experiment or project and specific goals to achieve. After completion of each project, you are expected to write a comprehensive report in a proper, scientific format, following the guidelines (see a separate handout). **Remember, writing a report is individual work and you may never copy or share ANY part of other people's reports, including drawings and tables,** even of your lab partner's. The only part you would share with your partner is the raw data, which is to be recorded in each individual's lab notebook.

Report Due and Late Penalty

The report deadline **is a week after the completion of each experiment**, unless the instructor gives a specific deadline otherwise. The late penalty will be -1%/day during the first 5 business days ("grace period"), **and -5%/day afterwards**. This means that you will receive 5% point deduction a week after the deadline, and -30% point deduction two weeks after the deadline. **The reports will NOT be accepted for grading if turned in two weeks or more after the deadline**, and a grade of zero will be given to the report. If you are granted an opportunity of a re-write for a report, the deadline of the re-written report is no later than 1 week after feedback was given.

Oral presentation

You will give an oral presentation on the outcome of the natural product separation project. The presentation will include how the separation and purification was carried out, and how two components are spectroscopically characterized. More detailed instruction on the presentation will be given at a later time.

Schedule

Dates	*Mondays*	*Wednesdays*
1/6,8	No class	Syllabus, Check-in, Lab notebook writing Chemdraw, Literature search & report writing
1/13,15	Dr. Ray, Organic 1	Dr. Ray, Organic 1
1/20,22	MLK Holiday	Dr. Ray, Organic 1
1/27,29	Dr. Ray, Organic 1	Dr. Ray, Organic 2
2/3,5	Dr. Ray, Organic 2	Dr. Ray, Organic 2
2/10,12	Dr. Ray, Organic 2	Natural product separation
2/17,19	Natural product separation	Natural product separation
2/24,26	Natural product separation	Natural product separation
3/2,4	Natural product separation	Natural product separation
3/9,11	Natural product separation	Natural product separation PRESENTATION
3/16,18	Spring break	Spring break
3/23,25	Dr. Fujita, Organometallic catalysis	Dr. Fujita, Organometallic catalysis
3/30, 4/1	Dr. Fujita, Organometallic catalysis	Spare day
4/6,8	Dr. Fujita, Organometallic catalysis	Dr. Fujita, Organometallic catalysis
4/13,15	Dr. Fujita, Organometallic catalysis	Dr. Fujita, Organometallic catalysis
4/20,22	Check out	
4/27		