Heideberg Organic Chemistry Lab

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Lab Manual

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About the Lab

The Heideberg lab is an Organic Chemistry Lab. Read through this manual carefully before proceeding with any lab work. Follow these rules closely and be attentive about the work you do in my lab. I expect dedication and diligence while you are here. If you have questions, email me or speak to a postdoc whose work is most closely related to your own.

I hold office hours on Tuesdays and Thursdays from 3:00pm- 4:00pm. This is a designated time for you to ask me questions. As part of your development as a scientist, I expect that you will check all applicable resources before consulting me. When I am otherwise busy, consult with the relevant postdoc(s).

I. Expectations

The overarching objective of my lab is to advance science. To achieve this, I am training a next generation of scientists who will be competitive on a national and international level. My role is to guide the science of the laboratory. I am often in the lab to ensure that there are no impediments to the productivity and quality of my lab's work.

Good mentoring is a two-way partnership. When you enter a doctoral program, you must commit the time and energy necessary to conduct research leading to a dissertation that makes a substantial and original contribution to knowledge. It is your responsibility to conform to University and program requirements and procedures. Although it is my duty to be reasonably available for consultation, the primary responsibility for keeping in touch rests with the student. The student's responsibilities include the following:

i. Expectations of all Lab Members

As a graduate student, it is your responsibility to become familiar with, and adhere to, the rules, policies, and procedures in place in this group, the department, and the University, as outlined in available resources such as this group policy document, the department graduate student manual, and other documents regarding the University policies that you received when you started your graduate career. Of particular importance are rules around Academic Integrity. You are expected to adhere to all deadlines and policies regarding registration, leaves of absence, limitations on time and recertification, dissertation submission, and graduation.

- All lab members are expected to provide meaningful contributions to the lab and follow all necessary precautions, including:
    - Completing the necessary safety training
    - Wearing proper lab attire: long pants or skirts and closed toed shoes, and tie back long hair. Do not wear shorts, short skirts, sandals, loose clothing, or dangling jewelry. Lab coats must cover the arms.
    - Maintaining a high level of cleanliness and organization
    - Providing rigorous and consistent work
    - Maintaining a level of professionalism
    - Minimizing distractions (social media, television, headphones, non-work related email, etc.) and absences
    - Keeping a diligent and regular schedule and keep advancing your research through that diligence
    - Being honest about your work
- It is up to you to make the most of all the training and opportunities you are given. It is essential to keep common spaces clean and organized, and return communal equipment to where you found it. If you use up common supplies and

solutions, you must refill them or order more. If problems occur in the lab, try to resolve them yourself before involving me.

ii. Expectations of Graduate Students and Postdocs

I expect graduate students and postdocs to be the driving force in the lab. As graduate students and postdocs, you must

- Be the expert on your project and your research field.
- Seek out research relevant to your work, and keep abreast of the latest tools and research in our field, even if it may not seem directly relevant to your work.
- Be an "independent researcher" meaning that you take ownership, gather knowledge, formulate ideas, and then bring all of that into a successful project.
- Mentor and train other students during their time in the lab.
- Treat your research with your full attention and dedication.
- Come to our weekly meetings prepared to give a verbal progress report describing all experiments completed during the week and a detailed plan and set of goals for the next week's work.

You will be given responsibilities in the lab, which I expect you to follow closely and diligently. Perform your lab duties with responsibility and consideration to other members.

iii. Expectations of Rotation Students

As rotation students, you must:

- Understand the expectations set out for you by the rotation instructor
- Communicate issues with your fellow researchers
- Put forth your best work in this lab. You are only here for a short time.

If you require assistance or advice, contact your paired graduate student or postdoc. You will be held to the same expectations as our full time research students, and expected to maintain our required level of professionalism while in the lab.

iv. Expectations of Undergraduate Students

Undergraduate Students will generally work on projects led by others within the lab. You will be expected to:

- Help with data collection and data analysis
- Commit to a minimum number of hours set at the beginning of each semester. Develop your weekly schedule with your project leader and maintain that schedule
- Promote your scientific career by engaging with research events

You will work with more seasoned researchers. Take this time to learn from them. This knowledge will be used to propel your scientific career forward.

Please note that **our lab is focused on effectiveness**. Your progress and performance will be evaluated on a regular basis. You are continuously expected to set small daily goals and to have at least a few day's worth of experiments planned ahead. A seasoned graduate student and full time RA (3rd year and above) would need to be capable of running at least five full, well-thought out experiments per academic year. A junior student (1st and 2nd year) would need at least two meaningful experiments completed during the semester. Your organization and goal-oriented planning are crucial for your overall success.

II. Working in the lab

i. Working hours

You are fully responsible for the progress and execution of your research project.

Therefore, you have essentially full control over your work schedule. The only temporal requirement is that you arrive to lab by 10:00 am at the latest to ensure that you can interact with other lab members. Also, don't work alone in the laboratory as no one can help you in the case of an emergency. Being in lab is a good way of learning from others, helping others, building camaraderie, having fast and easy access to resources (and people) you need, and being relatively free from distractions at home. Many students assume they can keep flexible hours, but I prefer my students to develop a regular schedule for those who depend on you. You will use an online timesheet in order to clock-in your hours. These sheets will be submitted to my assistant every other week for approval.

From the start date of appointment, all lab members are expected to work commensurate with your commitment to the laboratory. You must:

- Provide me with a schedule at the beginning of each semester.
- Tightly follow your schedule and request any changes to your schedule from me.
- Complete projects tasks in a timely manner

Although it is advised to schedule appointments outside of lab times, sometimes it is unavoidable. If you find that you need to take time away from the lab, you may do so. Occurrences for leaving the lab may include: doctor's appointment, counseling, dentist, or any other health-related service. Other life-related appointments (bank, DMV...) are acceptable, so long as they do not significantly impact your workday; however, if you will be missing more than 2h during the main workday (10am-12pm), please let my assistant know. If she does not respond before you leave, inform someone else in the lab so that you can be accounted for in the case of any emergency.

General quiet time: Quiet time is between 8am and 11am in the lab. Please respect other people's needs to work quietly in lab during those times by lowering your voice and

keeping any sounds or disruptions to a minimum. You may speak to others during this time if essential and you do it at an extremely low volume or out in the hallway.

ii. Lab meetings and seminars

You are expected to attend and actively participate in lab meetings. The lab meeting schedule is posted at the beginning of each semester. If you know you are unable to attend a meeting, notify my assistant at least 48 hours in advance. This way we can arrange for necessary adjustments. This will ensure that work can flow as smoothly as possible. Lab members are expected to bring a weekly progress report to discuss with the group. This should document what you have done for your projects and any communication which you have shared with collaborators (if applicable).

iii. Holidays and Absences

You are encouraged to remain in lab during holidays and are excused from those days listed in the university's academic calendar. Before being absent complete the following:

- Absence requests must be submitted to my assistant in writing at least three business days before the absence. It is your responsibility to assure you receive approval before absences.
- You should get your experiments to a suitable stopping point by stopping the protocols on an indicated secure step, or asking lab members in advance to maintain your procedures.
- If you are responsible for general tasks in the lab, have a written arrangement set up for these tasks so that other members may be able to pick up where you left off.
- Pre-prelim students (1st & 2nd year) are highly advised to take advantage of the winter break to start their research. Therefore, it is anticipated they are back on campus by Jan 2nd.
- If you find that you are ill, DO NOT come into the lab and infect others. Notify my assistant immediately through email specifying your plan to make up for lost research progress, and anyone who you are working with, so that they may continue your work while you are gone. You are expected to return back to the lab as soon as you are well or approved by a doctor.
- **Sick days:** Please stay home whenever you are sick. Working in the lab will make you feel worse, plus you will likely infect others. Send my assistant an email and inform her of your situation as well as your plan to make up for the missed research progress.
- If you seek to take more than four days off, consult my assistant at least four weeks in advance so the work of the laboratory is not impeded by your absence.
- **Vacation policy** You are entitled to 16 vacation days + all University acknowledged holidays per year (New Year's Day, Martin Luther King Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Christmas Day). If you work during the holidays, there is no rollover. Also, holidays cannot be carried over from one

appointment year to the next. One year is defined from the end of August to beginning of September. If more days are somehow needed, please talk with my assistant and assure that you have full advance approval from me. Every time you plan to be gone, inform my assistant in writing in advance. It is your responsibility to assure you receive approval before absences. If you seek to take more than four days off, please consult my assistant at least four weeks in advance so the work of the laboratory is not impeded by your absence.

III. Research Philosophy

i. Research Integrity

Scientific misconduct will not be tolerated in my lab. We must be forthright and honest about the experiments we conduct, especially when collaborating with other labs. Any attempt to manipulate, fabricate, or plagiarize data or analysis in ways that reflect poorly on this lab will be met with consequences up to and including expulsion from the university.

If you make a mistake, notify me or any of the postdocs in the lab, so we can correct it and move on.

ii. Work Ethic

In my lab, importance and rigor of scientific work determines our values and orients our desire to achieve our goals. You are expected to be self-motivated, to work hard and smart. This means doing your job to complete tasks in the most efficient way possible. Your experiments and other lab duties should be your highest priority. Most of you will be working on individual projects, but I will direct other lab members to assist on projects if I feel it is necessary. Use the skills you are expected to have already developed and resources from previous lab members to facilitate your work.

The use of any social media, texting, and watching movies while you are in the laboratory or office is not allowed. This is a working place and a professional environment. Do not contaminate our workplace with habits that have no place here.

IV. Experiments

i. Prioritizing Experiments

The Heideberg Lab prioritizes efficiency and reduction of waste. It will be your responsibility to take the lead in planning experiments for your own project(s). We will have an individual meeting at the beginning of each project and discuss your progress at lab meetings. The rest is up to you.

ii. Reproducibility

Reproducibility means that someone should be able to reproduce your exact results if given your raw data. Reproducibility on our experiments is of the utmost importance and is a key indicator of a good scientist. If you gave someone else your raw data or protocol, they should be able to reproduce your results exactly. This is critical because if they cannot reproduce your work exactly, it means one or both of you has made errors in the analysis, and that the work cannot be trusted. Reproducible research is an essential part of science, and is an expectation for all projects in the lab.

For results to be reproducible, the protocols and findings must be organized and well documented. To meet these goals, you should note any work that you do in your notebook. This means writing down how you did things every step of the way (and the order that you did things). It should go without mentioning that you should take detailed notes on your experimental design as well as your procedure/workflow so that every step is understandable to an outsider. Do this in your individual lab manuals and copy into the lab notebook. Ensure your document contains sufficient and detailed information to allow other lab members to reproduce your results. Annotate and write clearly, so that anyone who picks up your notes can understand them. You may be asked to walk through a procedure with another lab member.

iii. Collaborations

Communicate often with the other lab members in your collaboration. Be sure to keep a shared document or spreadsheet for any work which may be done in the process of your project. This document will also be kept to track who contributed to what, for authorship purposes. Be diligent with your work to ensure that everything runs smoothly.

iv. Authorship

Authorship will be limited to those who have made a significant scientific contribution to conceptualization, design, execution, and/or interpretation of the research study. Authors should ensure that care and effort have been taken to determine that all the data are complete, truthful, accurate, reasonably interpreted, and retrievable for re-analysis. Authors should ensure that in-house developed reagents and codes are fully-tested and in a distributable/publishable format. Our lab is dedicated to producing robust and reproducible science. Data manipulation of any kind will not be tolerated.

A full list of authors and proposed authorship order must be submitted to me before a manuscript can be submitted for publication. Final decisions for all authorship lists are approved by me.

v. Mistakes

Mistakes will undoubtedly occur throughout your time here and should be avoided as much as possible, to avoid slowing down our work flow and cause delays in data collection. Think through the procedure ahead of time and make sure everything is working and in place. Be organized and plan ahead. If you make a mistake, notify me. If you have made an error in experimental execution, record it in your lab notebook in detail and inform your collaborators. Ensure that your mistakes are not repeated, either by yourself or someone else.

vi. Data management

- **Lab Data**
  - Each lab member should back up raw data as well as any metadata needed to reproduce all processing/analyses. Lab data should be stored in your lab notebook and the shared lab drive. You should not edit master datasets. All data should be named as per lab standard [example: YYYYMMDD_Project_Experiment#_Run#_ExperimenterInitials]. Make a local copy of documents on your computer or your personal server space, and work from that. Whenever possible, avoid proprietary file formats when storing data, since future access is not guaranteed. Your experimental notes and analysis codes are crucial resources for the lab. They must be available and usable for verifying data in any publication. Code should be well annotated and able to be reproduced by another lab member without your input. Before you leave the lab, or upon completion of a project, you must archive old datasets and back them up. After you leave the lab, you leave the data. Only under the rarest circumstances will the data collected in this lab be available to you for further use/analysis.
- **Notebooks**
  - Lab members are expected to keep and maintain an electronic notebook for all of their work. Record any and all work that you accomplish in this notebook; you will refer to its contents while working on different projects. Make sure that everything written in your notebook is up to date and well-detailed. Keeping a complete and accurate record of experimental methods is crucial for science. Double (even triple) check that your work is accurate, because others may still use your notebook in the future to replicate studies. When saving your notes on our server, ensure that the notes are viewable to everyone (NOT EDITABLE). If you make changes to any document, make a copy and edit there, do not edit an original document.
  - When working in the notebooks remember to keep separate folders for each project. This is to ensure the utmost organization for you, and for others. Be sure to date and number every page in your notebook, for every project. Include any and all calculations so they can be checked if we have any issues. DO NOT use post-its, or separate sheets of paper. If you do not include your key results in the notebook, be sure to refer to any electronic database that houses the results. Include any applicable photos, code, or graphs that were taken/ made during the project.

For new lab members, I request that you print out a copy of this manual, sign it, and submit it to me to demonstrate that you have read and understood what I expect of you.

X_____

Date:_____