UNDERGRADUATE RESEARCH
Integrated land and water biogeochemistry

I am providing you with this statement of advising philosophy to enhance communication and transparency in our working relationship. It is intended to supplement our ongoing interactions and informal discussions and not to stand as a set of rigid requirements. I recognize that there is individual variability among my students in their backgrounds, aspirations, talents, progress, and accomplishments. My goal is to work with you to maximize your individual strengths and to help you develop the skills to succeed in your career. I am happy to discuss with you any or all of the items in the list below. This is a working document, and will be updated through feedback and accumulated experiences.

Note: Sections of this document were adapted from Scott Lanyon, Gordon Legge, and Moin Syed,the Heemstra lab https://www.sciencemag.org/careers/2019/08/why-some-professors-welcome-new-lab-members-clear-expectations-writing, Adair Lab, Dr. Christie Bahlai and Dr. Kirstie Whitaker.

1. General Information and requirements

Trainings:

- Complete the following online lab safety trainings **before** beginning labwork:
  https://www.uvm.edu/riskmanagement/train-and-inform-lab-personnel
  1) Chemical Safety in the Laboratory (online course),
  2) Laboratory Ventilation and Chemical Fume Hoods (online)**,**
  3) Laboratory Chemical Waste Disposal (online course) and
  4) Laboratory Safety Roles and Responsibilities (on-line course).
- If you will use XRD or XRF in your research you will need to complete radiation safety training: https://www.uvm.edu/riskmanagement/radiation-safety
- Complete the next available classroom training http://www.uvm.edu/safety/lab/safetytraining. Most students begin in Fall and you can simply join the annual training organized by Gaby Mora-Klepeis (Gabriela.Mora-Klepeis@uvm.edu) in our Department. If you begin work in spring or summer please check the web site and sign up for Emergency Response for Laboratory Workers (classroom - sign-up) and Keeping Your Lab Safe (classroom - sign-up) **within 3 months** of your starting date.
- Read the Lab rules and ask questions if anything is unclear (Appendix A)
- Read the Orientation Checklist for New Lab worker (Appendix B) and ask questions if anything is unclear during your first lab training with your mentor.

2. Lab Culture

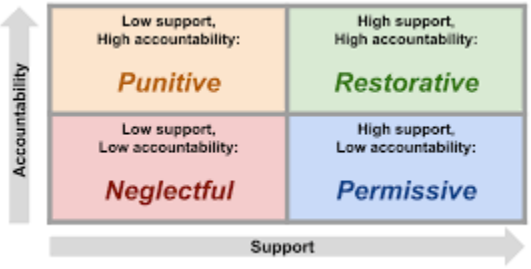
- **Harassment free environment:** we work to create an inclusive and welcoming environment and value the participation of every member of our community. Accordingly, everyone who participates in any project in our labs is expected to show respect and courtesy to other community members at all times. Discrimination or harassment based on racial or ethnic background, citizen status, gender, gender identity and expression, age, sexual orientation, ability, physical appearance, body size, race, or religion (or lack thereof) will not be tolerated.

This is also in accordance with UVM's Discrimination and Harassment Policy (https://www.uvm.edu/aaeo/policies_and_procedures). All communication - online and in person - should be appropriate for a professional audience including people of many different backgrounds. Sexual or discriminatory language and imagery is not appropriate at any time. Be kind to others. Do not insult or put down other contributors. Behave respectfully. Remember that harassment and sexist, racist, or exclusionary jokes are not appropriate. Please make an effort to create an inclusive environment for everyone. Give everyone a chance to talk and an opportunity to contribute. Utilize the correct pronouns for someone. If you do not know, simply ask. If you get it wrong, give a quick apology and get it right the next time. (https://uwm.edu/lgbtrc/support/gender-pronouns/). Watch

out for microaggressions: (https://www.psychologytoday.com/blog/microaggressions-in-everydaylife/201011/microaggressions-more-just-race).

Be aware that your actions can be hurtful to others or contribute to a negative environment even if you had no intent of harm. Listen. Offer a genuine apology. Commit to learning and doing better. Unacceptable behavior includes offensive verbal comments related to gender, gender identity and expression, age, sexual orientation, ability, physical appearance, body size, race, religion, sexual images in public spaces, deliberate intimidation, stalking, following, harassing photography or recording, sustained disruption of talks or other events, inappropriate physical contact, and unwelcome sexual advances.

Support and accountability: It is part of our lab culture to support ourselves and others and hold ourselves and others accountable for our actions. In the diagram below we want to be in the upper right corner.



This can mean coming prepared to meetings (accountability), but also ask for what you need (support). This means cleaning up after yourself, but not after others – instead have a conversation.

Mental health: We are all here to grow as scientists, leaders, and people by pursuing ambitious research goals. However, that should never come at the cost of your well-being. Your mental and physical health are by far the most important consideration in all that you do while in our lab. Moreover, success should not come at the cost of maintaining your interests/hobbies or healthy relationships in your life. In fact, you are more likely to be successful if you take care of yourself and give time to the things outside of work that matter to you.

- **Mental and physical health concerns.** *If you are not feeling well, either physically or mentally, take the time off you need to seek out help and take care of yourself.* If you are struggling with depression or anxiety and wondering: "Is it okay to go see a counselor instead of setting up an experiment?" the answer is "Absolutely! Get the help that you need." If you have an acute situation that requires help, take the day (or a few days) off with no questions asked. If you are going to be out for more than 3 days or miss a group meeting, give me a heads up so that I knows you are okay – no need to give details if you don't want to, it is sufficient to email**.** UVM has counseling and psychiatric services through the Center for Health and Wellbeing, which can offer confidential support: https://www.uvm.edu/health/CAPS. If you are concerned for the health and well-being of a UVM community member, please submit a CARE form here: https://www.uvm.edu/deanofstudents/student_advocacy/care_form.

Advisee-adviser relationship

- **Casual and boundaried:** My interaction style in lab, field and research is casual, which means that you can call me by my first name and we foster a casual, not hierarchical atmosphere in our work. This is possible, because we also have very clear boundaries. I'm here to support your growth in research, be your mentor and adviser. I will not engage in a personal friendship, I will not ask you personal questions, and I will not share personal stories. I also will respect your time and expect you do the same. For example, I will not contact you during after-hours (except in emergencies) or spring last-minute requests on you, and expect the same from you.

- **Communication:** Generally, the best way of contacting me is via email. If you would like to meet to discuss your project please schedule the meeting via email in advance. It is up to you if you prefer a hands on or hands off advising approach. Observe yourself, if you find yourself wanting frequent meetings, maybe you can work on independence. If you rather never meet, maybe you can work on asking for help. **Important: If you are in the lab and run into a critical situation, please come and see me in my office right away. You will not disturb or annoy me.**

- **Meetings**: Please come prepared to our meetings that will last between 30 and 60 minutes. "Prepared" can mean many different things and depends on where you are in your project. For example at the beginning of your work you may be browsing for a precise research direction. In this case "prepared" means than you began a review of relevant peer reviewed literature (see the library web page for info) and that you generated own ideas that we can discuss. Have notes organized and bring them with you. We will also meet to discuss progress with e.g. data collection. For this, have your data ready and organized on your computer, make plots in excel or come with ideas on how to use your data.

- **Responsibility:** It is a common misconception that the thesis adviser will find all issues with your work and serve as a failsafe (e.g. will find problems with your data spreadsheet or a wrong citation like a smoke detector finds smoke). The truth is that your advisers are very busy and seldom have the capacity to comb through such details. If you don't alert me, I might not look for a specific problem, so please take the responsibility for presenting carefully treated data seriously. If you are concerned about a specific aspect, point it out (in no uncertain ways). Example: you did some error calculation in excel and are not sure if the values make sense. Send the ORGANIZED and labelled spreadsheet with a very specific question (e.g. "I tried to propagate the error for X, Y and Z but I'm concerned that the values are too high, can you help?").
- **Software**: please use excel or jmp for data analysis, use endnote or another reference manager for your references, use word for text, ppt for presentations. Feel free to also use other programs (matlab, R etc.).

3. Research Milestones

Especially if you struggle with time management it may be helpful to keep a running log of research milestones with target dates. We can come back to these milestones during our meetings. Examples are:

- *Identify and read six articles- end of January*
- *Generate a testable hypothesis- end of January*
- *Independently operate instruments- February*
- *Complete analyses –End of March*
- *Plot and describe data, -April*
- *Submit abstract to a research conference, April 15th*
- *Synthesize data into a presentation etc. April 25th.*

APPENDIX A

PERDRIAL Biogeochemistry Lab Rules *updated 12/10/2016*

Safety:

1. Everybody who works in this lab has to complete the online lab safety training:
    - - Chemical Safety in the Laboratory
    - - Laboratory Chemical Waste Disposal
    - - Laboratory Safety Roles and Responsibilities
    - - Laboratory Ventilation and Fume Hoods

They can be found at http://esf.uvm.edu/courses/

2. Complete the "Orientation/Training Checklist for New Laboratory Employees" to make sure you are ready to begin working in the lab. Copys are available in 301 or here: http://www.uvm.edu/safety/sites/default/files/uploads/documents/newemployeechecklist2013.pdf
3. Adhere to standard safety rules discussed in the training, particularly:
    - ALWAYS wear closed-toe shoes and clothes that cover legs. This is tricky in the summer time but you can bring a spare set of clothes/shoes and store in the grey cabinet.
    - When handling acids/ bases wear goggles, labcoat and gloves.
    - Don't work alone in the lab (except if approved by Julia).
    - Please label all vials, bottles vessels with the green or orange labels and use secondary containers.
    - Know what you are doing and plan ahead. If you don't, PLEASE ask.

Etiquette and cleanliness:

4. Don't create labware orphans: Take care of your own labware and label samples, vessels etc..
5. Please be a good parent to "orphaned" items such as dishes. It may not be yours but if you see a beaker etc sitting in the same spot for weeks, take care of it (wash it). Exception: item or content may be hazardous, ask Julia or Nico.
6. If you finish something, replace it (e.g. let us know).
7. Be a good lab citizen: empty trash **before** its overflowing, refill labelling tape dispenser etc. Inquire about items that don't seem to belong to anybody, inform Julia about problems (unsafe practices, issues with cleanliness etc).
8. If you break something, let Julia know. It's normal that stuff breaks in a lab but we need to know to be able to fix or replace it.

9. please clean up after yourself and wipe all lab surface daily. We have a mixed use lab with processes generating dirt and dust just beside experiments that need a clean environment and need to avoid cross contamination.
10. 10. Its ok to store dishes on your bench, but put them in a wash bin and label it. Its ok to get more washbins (with lid) if you need (Grad students can can order).
11. Please keep the hoods and sinks clean and empty the soil trap regularly (weekly to monthly).
12. Please remove boxes and don't store them in the area of the electric panel. When you have a box you need to get rid of, fold it and put it in front of the lab. The custodial team will take them away.

Other:

13. If you order chemicals (grad students only), send Julia or Gaby an email. We need to update the chemicals inventory promptly.

UVM Risk Management & Safety

Orientation/Training Checklist for New Laboratory Workers

Employee's Name:_____ Date checklist started:_____ completed: _____

Trainer (PI/Supervisor/Designated Trainer): _____

I. General (www.uvm.edu/safety)

- ☐ Review Safety Website (www.uvm.edu/safety).
- ☐ Complete all required safety trainings. (http://www.uvm.edu/safety/lab/safetytraining)
- ☐ Complete Safety tour inside and outside of the lab including fire extinguishers, fire alarms, egress & exits, & safety equipment (PPE, showers, eyewash, chemical spill kit, telephone, cylinder restraints, disinfectants, etc).
- ☐ Review emergency response procedures specific to each lab, reporting procedures for accidents and injuries, and emergency phone numbers. (http://www.uvm.edu/safety/lab/prepare-for-emergencies)
- ☐ Review lab-specific and building-specific safety features (e.g. close lab doors, evacuation map & meeting site, gas shut-offs).
- ☐ Review the contents of Laboratory Safety Notebook and the Monthly Self-Inspection Checklist.
  - ☐ Review the location of Safety Data Sheets (SDSs).

II. Chemical Safety (http://www.uvm.edu/safety/lab/chemical-safety)

- ☐ Review or complete chemical hazard assessments, including Chemical Use Planning Forms, for the chemicals you will be handling in the laboratory.
- ☐ Understand what controls are required to minimize potential exposure to chemicals and other hazards in this lab. (http://www.uvm.edu/safety/lab/identify-and-control-hazards)
  - ☐ Engineering Controls: Fume hoods, biosafety cabinets, glove boxes, Schlenk line, snorkel exhaust, etc.
  - ☐ Administrative Controls: Standard Operating Procedures and lab-specific protocols
  - ☐ Proper Personal Protective Equipment: Lab coat, gloves, eye and face protection, respirator*

  **Must complete a Request for Respirator Use form and receive approval and instruction before using a respirator.*
- ☐ Review procedures for operating equipment (e.g. power tools, autoclave, NMR, kilns, ovens, engineering controls). Do not operate unfamiliar equipment or materials without proper training and approval.
- ☐ Review proper labeling, segregation, and storage for all chemicals used in this lab.
- ☐ Review chemical waste procedures including labeling, storage, and disposal.

III. Biosafety and Bloodborne Pathogens (http://www.uvm.edu/safety/lab/biological-safety)

- ☐ Review and sign-off on all laboratory infectious agents Standard Operating Procedures (SOPs).
- ☐ Understand how to use the proper controls in order to minimize any potential biological exposure.
- ☐ Review biohazardous waste procedures including labeling, storage, and disposal, disinfection of liquid waste, proper set-up of aspiration flasks, and biohazard box disposal.
- ☐ All employees who work with human or primate blood, blood-products or other potentially infectious materials must:
  - ☐ be designated "at risk" with Infectious Materials Risk Designation Form,
  - ☐ be offered the Hepatitis B vaccine with the HBV Vaccination Consent/Dissent Form, and
  - ☐ review the UVM Exposure Control Plan. (http://www.uvm.edu/safety/lab/bloodborne-pathogens-0)

IV. Other Laboratory Hazards

- ☐ Receive and document necessary training for any highly hazardous material or process, including lasers, time sensitive chemicals, highly toxic or reactive chemicals, pressurized devices, etc).
- ☐ Review safe handling procedures for gas cylinders (how to check for leaks, proper restraining & transport, etc).
- ☐ Review safe operating and handling procedures for thermal hazards (e.g. Liquid Nitrogen, ovens, kilns, autoclaves, hot plates, Bunsen burners, etc).
- ☐ Review proper disposal procedures for other wastes including sharps, broken glass, uncontaminated lab waste, batteries, and light bulbs.

I understand that this checklist is intended as a safety-training guide for my laboratory; it may not be a comprehensive list of all the training I may need to be safe from the hazards in my specific laboratory.

Employee's Signature:_____ Date Completed:_____ Revised 05/16

APPENDIX C

Undergraduate research rubric

	Great	**Solid**	**Not enough**
Laboratory Safety	Knows and follows correct safety procedures in the laboratory; actively seeks training or information when necessary.	Knows and follows correct safety procedures in the laboratory after receiving training.	Needs to be reminded repeatedly to engage in safe laboratory procedures.
Knowledge	Independently seeks thorough knowledge of the background using peer reviewed literature research. Has motivation for project.	Has a developing knowledge of the background and motivation for project. Has some familiarity with scientific literature	Needs to be repeatedly reminded to improve knowledge of the background and does not have motivation for project. Has minimal familiarity with scientific literature
Technical skills	Practices and shows skill and care in technical procedures and instruments. Is able to consistently reproduce high quality results.	Practices to improve skill in technical procedures and instruments. Quality of results may be inconsistent	Does not display skill in technical procedures and instruments. Consistently fails to reproduce results.
Independence, time management, and planning	Works without close supervision; Actively manages time to push project forward; Manages project and produces results in a timely manner. Generates ideas. Seeks advice from mentors adequately	Sometimes requires supervision in the planning or executing of experiments. Does manage time and is usually efficient at completing experiments. Seeks advice	Unable to work without supervision; does not plan experiments or manage time. Inefficient at completing experiments in a timely manner. Does not seek advice or does so for information that is easily obtainable elsewhere
Collegiality and Collaboration	Works well with peers and supervisors; begins to mentor or train others; gives and takes constructive criticism well; respects differing backgrounds and points of view	Works well with supervisors; takes constructive criticism; respects differing backgrounds and points of view	Has conflict with coworkers and supervisors; does not apply constructive criticism for improvement of performance; does not respect differences
Record keeping	Keeps complete, organized, and legible records in project folder and data spreadsheets	Keeps complete records, but they may be disorganized or have legibility issues.	Does not keep complete records, or components are missing, inadequate, or have unexplained gaps
Communication	Prepares oral or written reports that are complete, clear, formatted appropriately, and include appropriate citations.	Prepares oral and written reports that may have minor errors in completeness, format, grammar or delivery, or citation; improves with feedback and revision.	Prepares reports that are incomplete, poorly formatted, poorly written or delivered, or missing references. Shows little improvement after feedback

APPENDIX D: Example letter of recommendation

Note, the best letters contain examples that back up each statement. This is a letter I wrote for one of my students but I took most of the examples out to ensure privacy (I just left the "XXX is very diligent, resourceful and responsible" as an example). These letters vary based on individual strengths and challenges, please note that this is just one example. Typically such letters can be 1-2 pages long.

Environmental Biogeochemistry

The University of Vermont

213C Delehanty Hall
180 Colchester Ave.
Burlington, VT 05405,
USA

(802) 656-0665
Julia.Perdrial@uvm.edu

Date

Dear Dagobert,

It is my great pleasure to enthusiastically recommend XXX for XXX. **I have known XXX since XXX**, when he/she contacted me to work in my Environmental Biogeochemistry laboratory at the University of Vermont as undergraduate intern. As a research scientist and later assistant professor I've had the pleasure to work with over 30 talented students, however XXXs **enthusiasm, motivation, strong sense of responsibility and great attitude towards work are outstanding**. I would rate his/her performance in the top 3%.

XXX is **very diligent, resourceful and responsible** (Example: Soon after he/she began working in my lab he/she took over the analysis of XYZ samples after initial training. The fact that I entrusted XXX with this task speaks to the level of confidence I have in her capacities. He/she coordinated sample collection to ensure timely analysis of all samples, performed analyses, data QC, all in a self-motivated manner. He/she even improved SOP for analyses to **ensure the collection of quality data** in my lab. During this time he/she also learned many new techniques including XYZ analyses precise and self-organized on a suite of environmental samples. I was very impressed by his/ her ability to learn the science and procedures in a field that was new to him/her).

XXX is a very enthusiastic and focused learner with great interested in interdisciplinary research, especially water quality issues. His/her understanding and interest in environmental processes is impressive and so is his/her ability to apply learned materials to real world problems. (Example)

XXX **is a great team worker** and integrates will in a diverse group of students. (Example)

XXX contributed with own ideas to his research project (Example)

Finally, XXX has a calm but enthusiastic personality. He is good natured, outgoing and is really fun to work with. I have no reservations to give my highest recommendation for XXX, his curiosity and motivation are an outstanding addition to any program/business. It has been a delight to work with him/her, and I would be thrilled to do so again.

Sincerely,
Mickey Mouse