

Lab Expectations - Life Sciences (a generic template)

Please note: this document is just a template that will need to be customized by each PI and research group to address the topics that are relevant for their specific research projects/portfolio (not meant as a one size fits all!). The template includes several important lab expectations topics and each PI and research group is invited to review, use, add or discard topics, as needed.

A. Core values of this lab

Welcome to our lab! This is a place where we value honesty, trust, integrity, transparency, truthfulness, mutual respect, fairness, responsibility, inclusiveness, and hard work. As we build upon these foundational values we will maintain and improve our research productivity, reproducibility and replicability, rigor and integrity, and earn the public trust in our research.

B. Our research group - who we are

Our research group is led by a Principal Investigator (PI) who is a faculty member at Purdue. We may also have a Lab Manager who works directly with the PI to ensure coordination of research personnel and smooth operation of lab equipment. Postdoctoral fellows and Research Associates may be working here and they are trainees who have completed their doctoral studies and are gaining invaluable experience in preparation for their next career stage as an academic faculty member, industry professional, etc. Graduate students, Master or Ph.D. candidates, are working towards completion of independent research projects for their respective degrees. Undergraduate researchers are valuable members of the research group and may conduct independent research or assist other researchers in the lab. All group members are vital to the operation of our research lab and the generation of novel ideas through discovery. Mutual respect is the standard in this research group. A clear accounting of hours spent in the lab is strongly encouraged; please maintain a clear record of the hours spent working and participating in lab activities (especially when participation in research activities that require tracking for research credit or payment purposes).

For more information about people and our research portfolio, visit our Lab website: https://__.

C. Lab Expectations

This Lab Expectations manual is a living document and agreement between lab members that lays out the expectations for all members of the research group. The manual is meant to evolve across time to meet the needs and scope of our research portfolio. Each individual researcher in this group is expected to:

- Be fully present, involved in, and aware of, ongoing research studies taking place in the lab
- Complete required training, both general research training and specific for each project/equipment/data collection and analysis, and handling of research subjects
- When in doubt about research concepts, methods, experimental techniques, etc. used in the lab, never hesitate to ask the PI, Lab Manager, other colleagues, for clarification
- Be responsible for keeping a clean and safe environment for all
- Properly handle and safeguard equipment, materials, and data used in ongoing studies
- Be transparent with your work and honest about methods and techniques
- Keep clear and complete records of experiments, data collection and analysis for each project
- Be fair and respectful of all members of our research group and our colleagues

- Be responsible for lab equipment, reagents, chemicals, and resultant data
- Handle research subjects with the greatest care and respect to ensure no harm and least insult
- Protect the integrity, rigor, and reproducibility of the research performed in this lab; if you suspect misuse or mishandling of research data or subjects, or misrepresentation of research outcomes, talk to the PI and/or your colleagues immediately (it may be a misunderstanding that can be easily resolved or a just-in-time intervention to promote research integrity in our group)
- Report to the PI or Lab Manager any issues that may place people, subjects, surrounding labs, or the campus community at risk.

D. Responsible Conduct of Research and other Researcher Trainings

All researchers in this lab are expected to complete the Responsible Conduct of Research (RCR) training as required by Purdue's [RCR Standard \(S-20\)](#) and funding agencies. [RCR training](#) has an online component and a field/discipline-specific component. The online RCR training is meant to create a baseline RCR education and researchers are required to complete this training at their appropriate career level (e.g., Faculty, Postdoctoral, Graduate or Undergraduate) within 30 days of joining the lab.

Researchers are also required to complete RCR field/discipline-specific training through interactive RCR discussions within our group, with PI led and peer-to-peer training in lab/group meetings, at departmental as well as college level; field specific RCR training must be completed within the first 12 months of joining our research group and then refreshed as new members join our group and research projects are added to our portfolio. According to the updated RCR Training guidance issued by PHS agencies ([NIH](#), [AHRQ](#), [HRSA](#)) on Feb. 17, 2022, NOT-OD-22-055, [Updated Guidance: Requirement for Instruction in the Responsible Conduct of Research](#), the following general topics merit inclusion in instruction and discussions on the responsible conduct of research:

- Conflict of interest (personal, professional, and financial) and conflict of commitment, in allocating time, effort, or other research resources
- Policies regarding human and animal subjects in research, and safe laboratory practices
- Mentor/mentee responsibilities and relationships
- Safe research environments (e.g., those that promote inclusion and are free of sexual, racial, ethnic, disability and other forms of discriminatory harassment)
- Collaborative research, including collaborations with industry and investigators and institutions in other countries
- Peer review, including the responsibility for maintaining confidentiality and security in peer review
- Data acquisition and analysis; laboratory tools (e.g., tools for analyzing data and creating or working with digital images); recordkeeping practices, including methods such as electronic laboratory notebooks
- Secure and ethical data use; data confidentiality, management, sharing, and ownership
- Research misconduct and policies for handling misconduct
- Responsible authorship and publication
- The scientist as a responsible member of society, contemporary ethical issues in biomedical research, and the environmental and societal impacts of scientific research.

Consult [Purdue's RCR training website](#) for additional information and resources. Other types of research training are required to conduct research with integrity and to ensure safe and secure conditions for all engaged in the research process. Purdue developed a [Researcher Training decision tree](#) to assist researchers identify various required trainings as we engage in our specific areas of research. Please

review the decision tree to identify all research training applicable to you and check with the Lab Manager and the PI if you have any questions.

E. Study Design

Prior to beginning a research project in this lab, a full study design plan must be laid out. For each research project, the study design will include a clear description of methods and procedures that will be used to perform experiments, recruit participants, collect and analyze data. The study design must be based upon the capabilities of the lab, the techniques available and skills of our researchers. For some aims of our study, we may need to collaborate with other research groups including labs in our department, core lab services, etc. The type of subjects to be employed, and methods of the study must be clearly defined to obtain the best research data at the end of the study to answer our research question. What types of techniques and expertise will be needed to orchestrate the entire study? How many fellow researchers will you need to execute the study? What data output do you expect to obtain from this study? You must consider these questions in your study design, and not half-way through the study. How many publications will your data yield? What potential journals have you identified for these publications? Who will be an author on publications resulting from the project?

F. Lab Notebooks

This section will discuss the importance of keeping a lab notebook, physical or electronic, the rationale behind keeping a lab notebook, and how to keep a lab notebook for each research study. Maintaining a well-labeled and annotated lab notebook that is well written with clear, concise descriptions of the methods employed will lead to better accounting and reproducibility of each study and experiment performed. It is a historical document that will far exceed the bounds of human memory considering the turnover that takes place in lab settings across time. As technology is advancing lab notebooks may come in paper and electronic forms. Here are some ideas to help with lab notebook keeping:

- Never assume that “everybody knows it” so you don’t have to write it down. This small statement will keep focus on precision and not skipping steps in note keeping. History can be lost to time so be complete in your notes.
- Never assume you will remember all the details of a particular experiment or outcome. Memory can fade, alter, or be lost to time.
- Label the cover (paper notebook) or chose a project appropriate file name (electronic) so it will be clear to anyone reading it
- When using paper notebooks, make sure you use BOUND notebooks (as opposed to tear sheets or loose-leaf binders)
- Place the name of the researcher/lab for ease of identification
- Date and initial each entry for ease of identification
- Enter complete method strategies employed and skip no step. Never assume knowledge of others who will follow as some methods can change or be updated across time
- Each page should be its own set of data but label all entries for cross-referencing purposes or if the data/image is raw data or normalized data. This is critical for rigor and reproducibility
- Keep one lab notebook or file for each study, so data does not cross into other similar studies. This will avoid confusion and improve reproducibility in the future
- Experimental outcomes may be successful or may fail. Keep complete notes and enter your complete thoughts for future outcomes.

- List all reagents, chemicals, and procedures employed in a particular experiment. Change of reagents may alter outcomes and you will need precise information to figure out what went wrong should an experiment outcome be unsuccessful. These notes will help in future experiments.
- Record conclusions and next step research questions and enter rationales for those conclusions/questions to keep you on track.

Please also consult some excellent guidance on [Keeping a Lab Notebook, Basic Principles and Best Practices](#) developed at NIH.

G. Biological Sample Management

For each research project, specific sample and data management techniques are required to collect, store, and catalog each sample and batch of data. Before beginning a study involving biological samples, develop standard operating procedures for sample management from type, collection, processing, labeling, storage conditions, analysis, disposal plan etc. to ensure that the samples are of consistent quality and adequate for the intended analyses and study aims and stored or disposed appropriately at the end of the project. Establishing a consistent and transparent system for labeling and storage will preserve a clear history for each sample. Below is an example of a label for an individual sample (these may be in sticker form if on a vial):

Sample Type	Date Collected	Subject ID	Study#	Collector's Initials
Mouse Heart	11-03-2021	123	NIH 0001	SMC

For easier identification and tracking, it is critical to keep a master log for each sample and the study it belongs to. Any changes to the sample location need to be referenced in the master log. Additional guidance on collection, processing, storage and information management of biological samples can be found at: <https://pubmed.ncbi.nlm.nih.gov/22997855/>.

H. Lab Solution Preparation, Usage, Storage, and Disposal

The research projects conducted in our lab require many types of solutions to elicit the data needed to answer specific research questions. These solutions may be prepared in the lab or purchased and stored for use. Proper protocols are required to make and handle these solutions and researchers are responsible for choosing and following appropriate protocols for each research study. Here are some things to consider in our protocol/decision-making regarding solutions and chemicals.

- Prior to opening any container with chemical or biological samples, refer to the Material Safety Data Sheets to learn the classification of the material, proper handling, exposure risk, storage, steps to handle spills, inhalation, or ingestion, and disposal process of the material
- What is the purpose of the solution we are about to use? What role does each chemical or ingredient have in this solution?
- Prior to making a solution, have we ensured we have enough of each ingredient to make the desired solution? Does our solution require hand swirling to dissolve all the ingredients or do you need the use of a stir bar to suspend the solution? If so, does this require heating to dissolve ingredients?
- What temperature is our solution at its maximal effect? Does it need to be refrigerated or just stored at room temperature? Does exposure to light degrade the solution?
- Once made, have you placed a date on the container and recorded the shelf-life of the solution? Place your initials on the container as the person who made the solution. Record the entire recipe and process in your lab notebook so the exact same solution can be reproduced by others.

- Once expired, how should the solution be disposed of? Write-up the process for disposal in the notebook/file so your colleagues or future researchers will have proper guidance for disposal, even after you left the lab.
- Each step in the solution preparation process needs to be recorded in the project notebook/file. Some stock solutions can be made by anyone but you must understand inter-individual variability in the hands and weighing process of each ingredient. This can alter the pH of a solution you have made. Make sure the entire process is recorded and available to the lab for historical purposes, reproducibility and consistency. Proper logging of each step can lead to proper training and smooth transition of the projects in our lab from generation to generation of researchers.

I. Estimating Sample Size and Statistics

Research data is collected, recorded, created, and analyzed with the aim to discover new knowledge and produce original research results. It's a good idea to think about the data-related aspects of your research before you begin. How much data will you need to collect and what should be your sample size? If the sample size is large enough, every additional observation increases the power marginally and collecting additional data will increase the associated costs of your research study while providing little additional benefit. Similarly, low-powered studies result in overestimation of effect size and outcomes that are difficult to replicate. Use power analysis to determine the minimum sample size required for your experiment, given a desired significance level, effect size, and statistical power. Here are some things to keep in mind when planning your research.

- Identify appropriate statistical tests for the study. Let the PI know if you need training to use or help selecting appropriate statistical methods
- Once you run your power calculations, perform your study, run statistical analyses and obtain your output, think about normalizing your data
- Reconcile statistical outliers, if any; an outlier, usually three standard deviations beyond the mean (three sigma rule), may be eligible for removal from datasets. Consider the effect or removal on data integrity.

Resources for learning and understanding best practices for statistical analysis and avoiding common pitfalls can be found at: [Practices for Statistical Analysis](#) .

J. Data Management

Thoughtful data management is a good research practice that saves time and effort and contributes towards research reproducibility. You can quickly locate the information you require and make it available if necessary. Please consider the following topics when planning for research data management:

- What types of data will be created during the course of the project? How will the data files be organized and structured?
- For efficient retrieval and data interpretation, use a systematic method to label and map files. There is no one-size-fits-all approach, but it is critical to establish a standard for naming and structure files containing computational and experimental data before you begin generating large amounts of data. Poorly labeled files and structures may lead to confusion when retrieving and analyzing data, transferring files, etc.
- What will be the metadata format and content? Follow metadata standards to describe the data fields, labels, values, components and parameters, nature of the data files produced in terms of bytes, format, software used to create the file, version, and who created it.
- Who will own the data? Who all will have access to, and be responsible for managing these data?

- What equipment and methods will be used to capture and process data?
- Where will data be stored during and after the project? Do you need any server space? It is recommended to store the raw and normalized data in three separate storage places to prevent data loss. Encrypted data may be required if your project involves human subject research and this may need specific storage methods.
- Create backup and security plans for your data How frequently should the data be backed up?

Please refer to Purdue's [data handling policy](#) for additional guidance.

K. Authorship Policies

This lab has an established authorship policy which sets clear rules for authorship prior to starting a study. This lab does not support or take part in gift or ghost authorship as these are detrimental research practices. Gift authorship includes placing a prominent person on the publication or grant to improve opportunities to publish, or to pay back a collaborator who permitted this lab to perform work but made no significant contribution to the study. An author must fulfill the requirements for authorship established by the lab in order to be an author on a publication; people who contribute to research but do not meet the authorship requirements may be recognized in the acknowledgements section. The authorship requirements will be established in an authorship agreement and will be signed by all parties prior to the onset of any study; it will be revisited as the study progresses to update the lists of authors and contributors and address any authorship issues that may arise.

Many journals and professional organizations have their own authorship policies ([D. B. Resnik et al., 2016](#)) and our lab will ensure that we follow respective policies when submitting an article for publication. For example, the International Committee of Medical Journal Editors (ICMJE) offers [guidance](#) for establishing “*Who Is an Author*” on a journal article and recommends that authorship must be based on the following criteria.

- An author must have substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work; AND must draft the manuscript or revise it critically for important intellectual content; AND an/all author(s) must give final approval of the version to be published; AND an/all author(s) agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved
- All/any author should be able to identify which co-authors are responsible for specific other parts of the work; all authors should have confidence in the integrity of the contributions of their co-authors.

The Office of Research Integrity (ORI) has developed guidance on [Authorship and Publication practices](#); ORI has also developed a table that contains [general guidelines for authorship contributions](#) (shown below).

General Guidelines for Authorship Contributions

Contributions	Authorship? (■ yes; ■ no)	Comments
Design & interpretation of results	original idea, planning & input	 An idea alone may not warrant authorship, unless highly original & unique
	other intellectual contribution	 Yes, but assuming active involvement
Supervisory role	supervision of the project	 Yes, but assuming active involvement
	training, education	 No, unless substantive contribution made to study
	mentoring of 1st author	 No, unless substantive contribution made to study
Administrative & technical support	resources: \$	 Acknowledgements yes, authorship no
	resources: animals, reagents	 No if already published; yes if novel
	resources: patients	 Maybe, depending on circumstances
Data acquisition	original experimental work	 Yes, unless only very basic
	technical experimental work	 No if routine; yes if novel methods added, or specific role, e.g., statistics, imaging etc.
	data analysis (assays)	 Yes, unless only very basic
	data analysis (statistics)	 Yes, unless only very basic (t-tests e.g.)
Writing & other	drafting of manuscript	 Warrants first authorship
	reading/ commenting on manuscript	 Substantial feedback can be acknowledged
	none	 Includes honorary authorship for lab chiefs, celebrities etc.

L. Biosafety and Material Disposal

This lab uses chemical solutions, biological materials, recombinant DNA, lasers, radiological materials, etc. and follows Purdue guidelines for [Biological Safety](#) for proper use and handling procedures for biohazards. Each researcher is required to review this plan and familiarize themselves with respective procedures.

M. Mentor & Mentee Relationships

The Mentor/Mentee and Advisor/Advisee relationships are some of the foundational elements of researcher training and an important factor in the cohesiveness of a research team. The relationships are two-way streets and require careful nurturing. The PI will design a plan for the development of each mentee and may employ Advisor/Advisee or Mentor/Mentee agreements (e.g., [here is a sample of an agreement](#) developed by the University of Alabama Graduate School) to keep the development moving forward. The Advisee/Mentee is strongly encouraged to engage with the Mentor/Advisor and not just wait for the senior member to drive the relationship. Both the Mentor/Advisor and Mentee/Advisee are developing together throughout this process and it will take work of both parties. Guidance on how to build successful Advisor/Advisee relationships has been developed and is available from various resources, including [Purdue's Graduate School](#) (section entitled Advisor Issues), professional associations

(e.g., [American Psychological Association](#), Dingfelder, S., 2012) and [guidance](#) from Harvard/T.H. Chan School of Public Health on successful Mentor-Mentee relationships.

N. Research Lab Transitions & Departures

When leaving the lab, research personnel should clean up their desk, bench, and all other areas of the facility. Graduation and the end of a laboratory term can be busy. Below are some ideas that may help to navigate the exit process smoothly and ensure the continuity and integrity of lab operations.

- Review the labels and content of lab notebook/s (electronic or physical) to ensure the ease of data identification by other researchers and hand/transfer the notebooks/files to the PI/Lab manager.
- Survey the shared storage units such as refrigerators, freezers, cold rooms, stock rooms, etc. to locate and appropriately designate/dispose remaining chemicals and biological materials.
- Ensure all chemical containers are properly closed and labeled.
- Follow the biosafety guidelines for the disposal of any unknown chemicals in your bench space.
- Clean and decontaminate the equipment that you used. Ensure that the manuals/software/maintenance records are retained with the equipment.
- Return borrowed equipment and/or chemicals if any.
- Speak to your supervisor about the transfer/custody of computer passwords.
- Forward any unfinished work/incomplete data to the people who will take over the experiments.
- Clean your office and bench space.
- Have a discussion with your supervisor on your [ownership and access](#) to the data that was generated by you.
 - ✓ As a rule, Purdue owns the data generated on research projects conducted at Purdue or using Purdue resources
 - ✓ The PI is the custodian of the data and may have a right to have a copy of the data upon departure from Purdue
 - ✓ The departing researchers may have rights to some data, depending on the PI and university needs for data protection (e.g., when applying for an IP patent).
- Before departure, researchers are required to disclose intellectual property and copyrightable materials to Purdue/OTC as required by [Purdue's policy on intellectual property](#)
- Discuss what research data you may take with you to begin your next career stage. This may depend upon several issues to clarify before departure
 - ✓ What is the funding source of the research project and what kind of agreements are in place for data and IP ownership?
 - ✓ Does the PI have rights to a departing researcher's ideas?
 - ✓ Does the departing researcher have rights to ongoing research from the lab the researcher is departing?
- Plan out the manuscripts, clarify your role/authorship and journal destinations for each manuscript and list of other authors on each manuscript. With changes of career stage, it is not uncommon for pressure to be placed upon a departing researcher (such as gift authorship and other [detrimental/questionable research practices](#)).

Additional guidance developed for faculty/PIs who are leaving Purdue/offboarding (moving to other institutions or retiring) may be valuable when drafting your Lab Expectations document:

https://www.purdue.edu/business/sps/postaward/faculty/faculty_offboarding.html

Note: Please send your comments or suggestions on how to improve this Lab Expectations Template – Life Sciences to RCRTraining@purdue.edu.

Resources and Useful Links

- Purdue University Code of Conduct
https://www.purdue.edu/purdue/about/integrity_statement.php
- Purdue University Responsible Conduct of Research Standard (S-20)
<https://www.purdue.edu/policies/academic-research-affairs/s20.html>
- Purdue University Chemistry 499 research syllabus
 - <https://www.chem.purdue.edu/courses/chm49900/CHM%2049900%20SyllabusF21SP22a.pdf>
- National Institute of Health Laboratory Notebook guidelines
 - [https://www.training.nih.gov/assets/Lab_Notebook_508_\(new\).pdf](https://www.training.nih.gov/assets/Lab_Notebook_508_(new).pdf)
- National Library of Medicine guideline for understanding research design
 - <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6996664/>
- National Library of Medicine guideline for working with chemicals
 - <https://www.ncbi.nlm.nih.gov/books/NBK55872/>
- Safety data sheets for chemical information and handling
 - <https://chemicalsafety.com/sds-search/>
- National Library of Medicine guide for mentor mentee relationships
 - <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5798810/>
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