

Optical Imaging and Spectroscopy Lab Manual

PI: Francisco (Paco) Robles
Robles@gatech.edu

Table of Contents

1	<i>Introduction</i>	3
2	<i>Equity, Diversity and Inclusion</i>	3
3	<i>Code of Conduct</i>	3
4	<i>Funding</i>	4
5	<i>Being in the lab</i>	4
5.1	Everyone	4
5.1.1	Big picture	4
5.1.2	Small picture	4
5.2	Principal Investigator	5
5.3	Postdocs and Staff Scientists.....	5
5.4	PhD students	5
5.5	Undergraduate researchers	6
6	<i>Communication</i>	6
7	<i>Calendars.....</i>	6
8	<i>Science</i>	7
8.1	Big picture	7
8.2	Scientific integrity.....	7
8.3	Lab notebook	7
8.4	Data Management and organization.....	7
8.5	Authorship	7
8.6	Scientific writing	8
8.7	Figures.....	9
8.8	Travel to conference	9
8.9	Conference presentations and posters.....	9
8.10	Lab meetings	10
8.11	One on one meetings.....	10
8.12	Journal club	10

9	<i>Other</i>	10
9.1	Purchases	10
9.2	Recommendation Letters	10
9.3	Vacation and time off	11
9.4	Professional and student societies/organizations	11

1 Introduction

Welcome to the Optical Imaging and Spectroscopy Lab! My goal as the director of the OIS lab is to foster an environment of consistent scientific excellence and personal development that supports every lab member in reaching their full potential and helps us have fun while doing great science. I want you to be happy and productive while you are here. This manual is a first point of reference for current lab members as we strive to achieve these goals and serves as a general introduction for prospective members. You can also find more information about the lab in the lab website:

<https://robleslab.gatech.edu/>

For Updates on **COVID-19** ramp up plan, policies and procedures, refer to the shared Evernote document [OIS Lab Continuity Plan](#).

2 Equity, Diversity and Inclusion

The OIS lab and the Wallace H. Coulter Department of Biomedical Engineering at Georgia Tech and Emory University affirms our institutions' efforts to promote equity, diversity and inclusion on our campuses and beyond. We strive to create an environment that values and respects our individual and communal differences. We aspire to cultivate leaders in engineering and medicine who champion an inclusive culture. Our core values are strengthened when all members have a voice and are encouraged to contribute. We are also proud to be a national leader in producing a diverse population of engineers, and are committed to continuing this excellent standard.

We believe that Black Lives Matter and therefore stand committed in the fight against racism, discrimination, racial bias, and racial injustice.

3 Code of Conduct

The lab, and the university, is an environment that must be free of harassment and discrimination. All lab members are expected to abide by the Georgia Tech policies on discrimination and harassment, which you can (and must) read about [here](#).

The lab is committed to ensuring a safe, friendly, and accepting environment for everybody. We will not tolerate any verbal or physical harassment or discrimination on the basis of gender, gender identity and expression, sexual orientation, disability, physical appearance, body size, race, or religion. We will not tolerate intimidation, stalking, following, unwanted photography or video recording, sustained disruption of talks or other events, inappropriate physical contact, and unwelcome sexual attention. Finally, it should go without saying that lewd language and behavior have no place in the lab, including any lab outings.

If you notice someone being harassed, or are harassed yourself, report immediately to [EthicsPoint](#). Georgia Tech has partnered with EthicsPoint, Inc. to provide a means for members of the Georgia Tech community to report issues of concern. This internet-based reporting system allows anonymous communications and feedback. This helps ensure that the Institute can respond to concerns in the most efficient and effective manner. My door is always open and you may come talk to me about anything including adverse situations, but please note that I am required by law to report any issues dealing with [Title IX](#).

4 Funding

External funding supplies the vast majority of resources needed to conduct our research, including salary for personnel, equipment, subject payment, and so on. It is important that we run the lab in a way that shows we use our research funding wisely. Most of our funding is supported by the taxpaying public (NSF, NIH). All Funding sources must be acknowledged in our public work, including presentations (posters and oral), conference proceedings and publications.

The OIS lab currently has funding from 9 independent sources. It is important that you check in with the lab PI to see which sources should be acknowledged for your public work, and which sources should be used to purchase equipment.

5 Being in the lab

5.1 Everyone

5.1.1 Big picture

We expect each other to:

- Push the envelope of scientific discovery and personal excellence.
- Do work we are proud of individually and as a group.
- Double-check our work and be at least a little obsessive. (I am really obsessive...)
 - **Sanity Checks!!!** (If you haven't heard me talk about these, you will...). More in the [Science](#) section
- Be supportive—we're all in this together.
- Be independent when possible, ask for help when necessary. You are here to learn AND innovate!
- Communicate honestly, even when it is difficult.
- Share your knowledge. Mentorship takes many forms, but frequently involves looking out for those more junior (but not necessarily).
- Work towards proficiency in Matlab, Labview, and Adobe Illustrator (it's your friend for figures). Bonus points for Python, SolidWorks, Zemax and LaTeX.
- Advocate for our own needs, including personal and career goals.
- Respect each other's strengths, weaknesses, differences, and beliefs.
- Responsible research conduct (RCR) is paramount. All results/data must be reported openly and truthfully. Remember, negative results can lead to very positive new science! See more in the [Science](#) section and [RCR@GT](#).
- For more resources for graduate students, see the [Graduate Student handbook](#).
- For more resources for Postdocs, see the [Office of Postdoctoral Services website](#).
- **In general, keep everything awesome!**

5.1.2 Small picture

We're sharing a relatively small space, so please be thoughtful of others, including (but not limited to):

- **Do not come to the lab if you are sick.** It's better to keep everyone healthy. Health is especially important because we are in relatively small quarters and we have a responsibility to keep

everyone healthy (plus, you know, **COVID-19**...). If you are sick, email me (lab PI) to let me know you won't be coming in, and update the OIS lab calendar to reflect changes.

- No food or drinks in the lab (other than water in closed containers).
- Do not leave food, drinks or crumbs in your workspace (especially lab but also office).
- You aren't expected to come into lab on weekends and holidays, and you aren't expected to stay late at night. You are expected to get your work done (whatever time of day you like to do it).
- Show up to your meetings, show up to your classes, and show up to lab meetings on time.
- Keep the lab neat.
- **Thorough lab clean ups will be performed collectively on a monthly basis on the first Friday of every month.**
 - With **COVID-19** restrictions, PI will assign individual cleaning duties. This is not ideal (and may not be the most fair) but we must maintain a clean environment while social distancing.

5.2 Principal Investigator

You can expect me to:

- Have a vision of where the lab is going.
- Care about your happiness.
- Obtain the funding to support the science and the people in the lab.
- Support you in your career development, including writing letters of recommendation, introductions to other scientists, conference travel, and promoting your work as often as possible.
- Be available in person and via e-mail on a regular basis, including regular meetings to discuss your research (and anything else you'd like to discuss)
- Support you in your personal growth by giving you flexibility in working hours and environment and encouraging you to do things other than science.
- Treat you to coffee and pizza (lots of pizza!)
- Make the time to meet with you regularly, read through your manuscripts, and talk about science.
- Obsess over font choice/size, punctuation, and graphic design.

5.3 Postdocs and Staff Scientists

- I expect postdocs to move towards being more PI-like, including writing grants, seek independent funding, coming up with independent ideas, giving talks, and cultivating an independent research program (while still supporting the lab's research). And, to have (or acquire) the technical and open science skills listed for PhD students, below.
- Postdoc salaries generally follow NIH guidelines (regardless of the source of funding).

5.4 PhD students

I expect PhD students to:

- Move towards becoming an independent thinker.
- Know the literature related to their topic like the back of their hand.

- You will become the world experts on your research topic, and you will help push our field forward by being creative and innovative.
- Seek out and apply for fellowships and awards (including travel awards, etc.).
- Realize there are times for pulling all-nighters, and times for leaving early to go to the park and enjoy the sunshine.

By the time you're done, you will have to know how to follow the scientific method and follow your curiosity in a systematic way. You will learn how to do signal processing, data analysis and statistics, and share your work with me and the world using any adequate tools. The learning curve can be steep but it's well worth it.

5.5 Undergraduate researchers

I expect undergraduates to be utterly reliable and willing to help with whatever projects need it. At a bare minimum, reliability includes showing up on time, keeping a record of your hours on the lab (on the honor system), and making sure that all of your work is accurate (double-check everything).

6 Communication

I am usually busier than I'd like to be, and as a result have less time for talking to folks than I'd like. However, **you (lab members) are one of the most important parts of my job**, and I need your help to stay organized and involved in the things I need to be involved in. Some general rules of thumb are:

- Be proactive—tell me what you need. it is up to you to make sure nothing falls through the cracks. This includes coming to knock on my door even if it seems like you are interrupting, emailing me to set up a time to meet, sending me a text message, or catching me before or after lab meeting.
- Write things down and remind me what we've talked about. I would love to remember everything we decided when we met last week, but this doesn't always happen. Don't hesitate to bring me up to speed when we meet. Even if I already remember what we are talking about, a couple of introductory topic sentences will help get me in the right frame of mind. Be sure to write down everything in your lab notebook!
- I can be the most helpful to everyone if you are a little bit strategic in what you ask me. Please check the lab manual, other people in the lab, and a Google search before shooting me off a question.

7 calendars

During COVID-19, it is important to sign-up in the lab calendar to ensure we are able to social distance. Please book 48-24 hours in advance to allow other to plan ahead. If using the 3rd floor machine shop, please sign up in the Machine Shop Calendar.

8 Science

8.1 Big picture

You own your project. Take the lead. Innovate. Yes, you will get a lot of feedback from me and other team members but ultimately you are in the driver's seat.

8.2 Scientific integrity

You have a responsibility to me, the institutions that support our work, and the broader scientific community to uphold the highest standards of scientific accuracy and integrity. By being in the lab you agree to adhere to professional ethical standards. **There is never an excuse for fabricating or misrepresenting data.** If you have any questions, or in the unlikely event that you have concerns about a research practice you have seen in the lab, please talk to me immediately.

It is also important that you prioritize the accuracy of your work while in the lab. Unintentional errors due to inattentiveness or rushing can be extremely damaging and produce results that turn out to be incorrect. Although there is always a pressure for a high quantity of research, **it is critical that everything we do is of the highest quality.** Please double-check your work frequently. **Sanity checks!** In many cases multiple people will double-check a data set to ensure no mistakes have crept in along the way.

For more on responsible conduct of research, click [here](#).

8.3 Lab notebook

Everyone conducting an independent research project should have a lab notebook for keeping track of discussions, experiments, and taking notes. You may also want to use an electronic notebook (e.g., Evernote) as your primary lab notebook, or to supplement a paper copy. The important thing is that you are keeping notes, that they are in one place, and **that everyone has access to the files.** Your notebook will be used by future lab members to reproduce all details of a procedure, replicate experiments/results, and push the project forward. Pay attention to details.

8.4 Data Management and organization

- Make sure your work is always backed up in the server or lab external hard drives.
- When saving files on the server, lab computer, or back hard drives all data must be organized in the following format:
 - System/ProjectName/YYYYMMDD_ExperimentName/{RawData, ProcessedData, etc.}
- In each ExperimentName folder, you must add a text file describing the general format of the raw data and conditions of the experiment. Alternatively, this must be clearly described in your [Lab Notebook](#).
- **Do not** label any folder "NEW..." or "UPDATE..." Everything we do is new, and clear descriptions are needed for future lab members to find old data sets.

8.5 Authorship

In my view there are two key requirements for being an author:

1. Contribute to the intellectual scientific content of the manuscript in a meaningful way.
2. Contribute to the writing of the manuscript in a meaningful way.

Note that “collect data” or “analyze data” aren’t on the list. Those are very important parts of a paper, but do not (on their own) warrant authorship. Being an author means understanding the content and being willing to take public responsibility for the work: a large part of this concerns the theoretical motivation, experimental conditions, and implications of the research. In practice, meaningful theoretical and experimental contributions are most often made through helping with the study design, enabling methodology, developing an experimental system, and data interpretation.

Typically, one person will take on the main responsibility for writing the paper, and this person will be the first author. When authorship order is not readily evident, this will be discussed openly with all relevant parties.

I assume that, unless we have talked about it, I will be an author on papers coming out of the lab. This does not mean that you should add me on to papers as a courtesy; it means that I expect you to include me in the process of discussion and writing in a way that merits authorship. In other words, the same approach I take with you.

It is worth pointing out that there are many views regarding authorship, and within any view there are always borderline cases. When collaborating with other people, I tend to defer to their own lab culture. However, it’s important that within our own lab, we are clear on the expectations for authorship and transparent about authorship discussions and decisions. If you ever have any questions, please come speak to me.

8.6 Scientific writing

“The fundamental purpose of scientific discourse is not the mere presentation of information and thought, but rather its actual communication. It does not matter how pleased an author might be to have converted all the right data into sentences and paragraphs; it matters only whether a large majority of the reading audience accurately perceives what the author had in mind. Therefore, in order to understand how best to improve writing, we would do well to understand better how readers go about reading.” This is an excerpt from [George Gopen and Judith Swan on Writing with the Reader in Mind](#). **Everyone in the lab needs to read this article.**

“Science is often hard to read. Most people assume that its difficulties are born out of necessity, out of the extreme complexity of scientific concepts, data and analysis. [They] argue here that complexity of thought need not lead to impenetrability of expression.”

Yes, I do obsess about sentence structure and making sure we are presenting our work in the clearest possible way.

Quick summary:

1. Follow a grammatical subject as soon as possible with its verb.
2. Place in the stress position (end of sentence) the "new information" you want the reader to emphasize.
3. Place the person or thing whose "story" a sentence is telling at the beginning of the sentence, in the topic position.
4. Place appropriate "old information" (material already stated in the discourse) in the topic position for linkage backward and contextualization forward.

5. Articulate the action of every clause or sentence in its verb.
6. In general, provide context for your reader before asking that reader to consider anything new.
7. In general, try to ensure that the relative emphases of the substance coincide with the relative expectations for emphasis raised by the structure.
8. Use jargon only when necessary.
9. Avoid using fancy words in places where more common words convey the same meaning. If you do not intend the word to stand out, this will only distract the reader from your message.
10. Make it easy for the reader to understand what you are trying to say.

8.7 Figures

All figures intended for outward facing documents (abstracts, papers, presentations) must be clearly labeled and legible. I highly encourage you to use Adobe Illustrator with figure in vector format. For papers and abstract, make sure to work on a canvas that is of the same size (in inches) as the intended print size. This will prevent surprises with font sizes and legibility issues in general, resolution, and file size when the document is printed. Figures should be exported at a resolution of 300 dpi for papers. Figures for presentations can tolerate a lower resolution but make sure everything is clearly legible.

8.8 Travel to conference

- **You must have explicit permission by the PI to attend a conference.**
- **You must coordinate with the PI and administrative assistant for booking hotel rooms and airfare.**
 - **All booking must be done in a timely manner to avoid overcharges due to last minute purchases**
- **You must register by the early registration deadline.**
- **You are expected to look for external funding. BME graduate students can apply for travel funds through our program. SPIE and OSA also have travel awards.**

8.9 Conference presentations and posters

Learning to present your research is important. Very few people will read your papers carefully (sad, but true) but you can reach a lot of people at conference talks and posters. Also, if you plan on staying in academia, getting a post-doc position and getting a faculty position both significantly depend on your ability to present your data. Even if you want to leave academia, presentations are likely to be an important part of your job. Additionally, every time you present your work, you are representing not just yourself but the entire lab.

It is therefore highly encouraged that you seek out opportunities to present your research, whether it is at departmental talk series and events, to other labs (within or outside of GT/Emory), at conferences, or to the general public. If you are going to give a presentation (a poster or a talk), be prepared to give a practice presentation to the lab at least one week ahead of time (two weeks or more are advisable for conference presentations, and many weeks ahead of time are advisable for job talks, which require much refining). Practice talks will help you feel comfortable with your presentation and will also allow you to get feedback from the lab and implement those changes well in advance of your real presentation.

Templates for posters and talks are available here ([poster example 1](#), [poster example 2](#), [PPT template](#)), and you can use those as much or as little as you'd like. Some general rules for posters and talks should

be followed: minimize text as much as possible (if you wrote a paragraph, you're doing it wrong except for short abstract for posters), make figures and text large and easy to see at a distance, label your axes, and make sure different colors are easily discriminable. Other than that, go with your own style.

8.10 Lab meetings

The main idea for labs meetings is to (1) update the team on project progress and (2) get feedback from all lab members. The update does not need to be lengthy or in a formal ppt presentation. There is no specific format—use whatever style is best to highlight project progress. **Lab meetings are mandatory for all group members.** Participation and feedback is highly encouraged from all members on any and all projects. Meeting are typically on Mondays. Time varies depending on the team's schedule.

Approximately once every semester, each member will give a 20-minute, conference-style presentation about their project. The idea is to ensure all lab members are aware of broader scope of each member's project. Whereas the weekly updates are meant to serve as detailed look at the work in the past week, this presentation will give you an opportunity to describe your work in a broader context, including highlighting the motivation, challenges, and your specific methodology with exciting and on-going progress.

8.11 One on one meetings

These meetings are optional for graduate students and postdocs. We typically schedule one hour per week on Wednesdays or Thursdays. There is no agenda. Common topics include, but limited to, going over data, discussing research/academic challenges, course planning, brainstorming on future directions or any other topic you deem important.

8.12 Journal club

Our weekly journal club is a fun way to learn more about the field of optics and practice your presentation skills in a low-pressure environment among your peers. Currently we meet on Fridays at 4pm over bluejeans.

<https://bipsgatech.github.io/journal-club>

9 Other

9.1 Purchases

The PI must approve all purchases and must explicitly give you a project number to order anything.

That being said, as a rule of thumb, for any purchases under \$5,000, the quick answer is yes, you can buy that. If supplies are running low, it is better to order before we run out.

More expensive items will need a stronger justification, but I am always happy to get new toys! Do not hesitate to contact me if you think a new piece of equipment can help.

9.2 Recommendation Letters

It is part of my job (and, thankfully, quite often a pleasure) to write letters of recommendation for people in the lab. Letters of recommendation are also extremely important for getting new positions and grants. You can count on me to write you a letter if you have been in the lab at least one year (it's

hard to really know someone if they have only been around for a few months). Exceptions can be made for summer students (but consider asking others who may know your work for longer). Other common exceptions are if students or post-docs are applying for fellowships shortly after starting in the lab.

If you need a letter, notify me as soon as possible with the deadline (and a reminder a week before the deadline), your CV, and any relevant instructions for the content of the letter. If the letter is for a grant, also include your specific aims. If the letter is for a job, also include relevant experience. In some cases (especially if short notice is given), you may also be asked to submit a draft of a letter, which will be modified based on my experience with you, made more glamorous (people are much too humble about themselves!), and edited to add anything you left out that I think is important. This will ensure that the letter contains all the information you need, and that it is submitted on time.

9.3 Vacation and time off

- Vacation days per year (not including holidays): 20
- For 1 to 2 days off, notify PI at least 1 week in advance
- For 1 week off, notify PI at least 1 month in advance
- More than one week at a time will be considered on a case-by-case scenario

9.4 Professional and student societies/organizations

- [OSA student member](#)
- [SPIE member](#)
- [BiPS: Biomedical Photonics Society](#)
- [BBUGS: The Bioengineering and Bioscience Unified Graduate Students](#)
- [BGSA: Black Graduate Student Association](#)
- [WIE: Women in Engineering](#)
- [wBME: Women in Biomedical Engineering](#)
- For more resources in other student organizations, click [here](#).