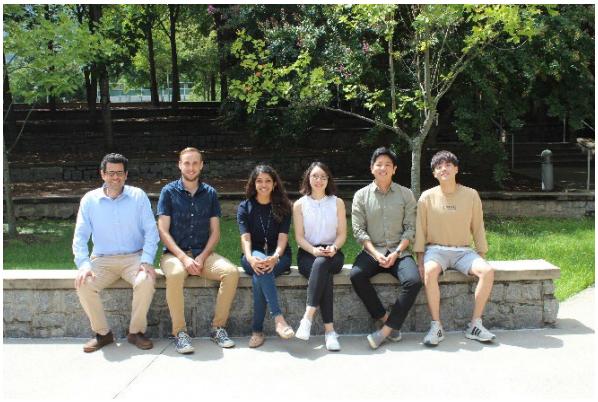
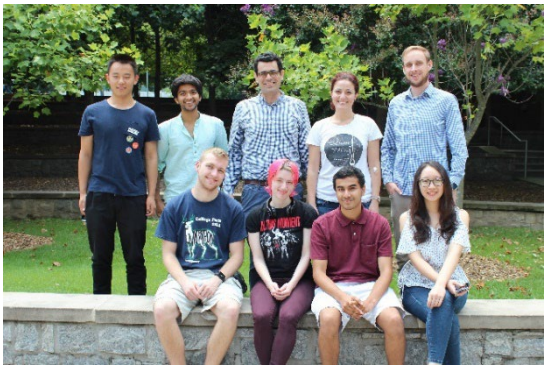
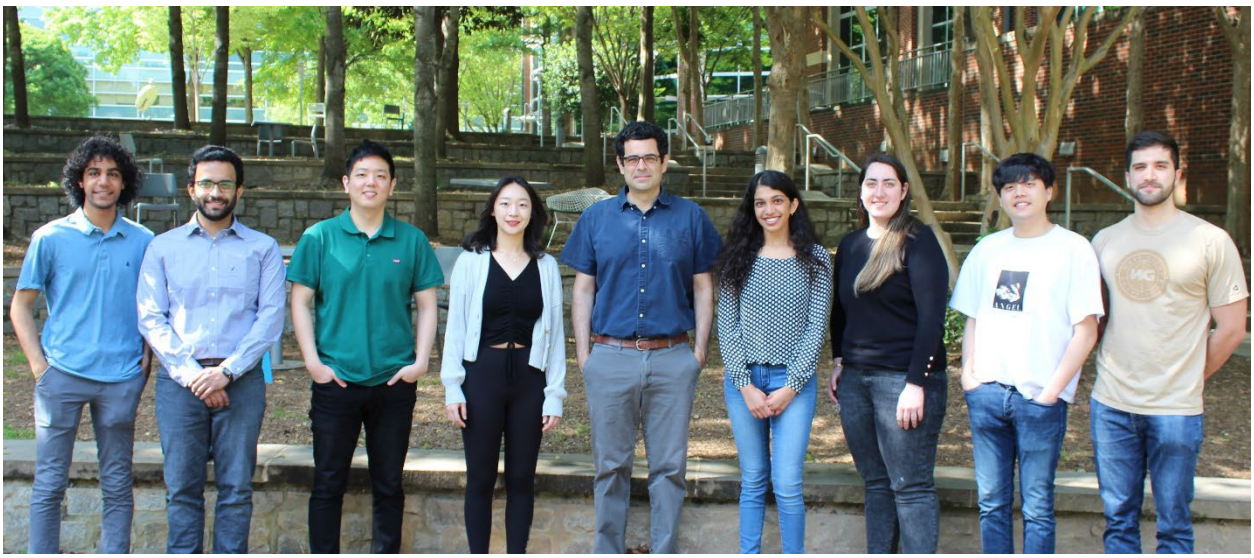
# Lab Handbook







# Table of Contents

**Welcome**

**Expectations and Responsibilities**

**Code of Conduct**

**Lab Organization**

**Lab Resources**

**Research Dissemination**

**Journal Club**

**Lab Safety and Training**

**Additional Resources**

**Settling in Atlanta**

**Appendix**

# Welcome!

It looks like you recently joined the UBL in Georgia Tech's School of Mechanical Engineering and Department of Biomedical Engineering. That's great! We're really glad to have you here and will do what we can to make your time in the lab amazing. Our laboratory offers research experiences and training opportunities that will help you develop both personally and professionally.

We thrive to conduct impactful research that we are excited and proud of it. We work together to create an environment where each lab member grows through a friendly, supportive and open culture. Specifically, we will ensure: a) healthy communication, b) transparent knowledge and resource sharing, c) mutual support & respect, d) learning from each other, e) admitting our mistakes and f) challenging ourselves to improve our science and professional development.

The lab is dedicated to providing a harassment-free experience for everyone, regardless of gender, gender identity and expression, age, sexual orientation, disability, physical appearance, body size, race, or religion (or lack thereof). We do not tolerate harassment of lab members in any form. Sexual language and imagery is generally not appropriate for any lab venue, including lab meetings, presentations, or discussions.

The overarching goal of our research program is the discovery and translation to the clinics of novel therapeutic interventions against human disease. Specific areas of our research include biomedical ultrasonics, linear and nonlinear acoustics, sound propagation in complex media (brain/skull), microbubble dynamics (acoustic cavitation) and control, and image guided therapy. Our lab is particularly active in the field of cancer research, where we conduct fundamental investigations on ultrasound and microbubble-meditated mass transport in brain tumors and develop computational tools to support the more rational design of focused-ultrasound-based treatment of brain cancer.

When you join the lab, you're expected to read this manual and sign a form indicating that you have done so.

This lab manual was inspired by several others, and borrows heavily from them (e.g., this one and this one). It's also a work in progress. If you have ideas about things to add, or what to clarify, talk to me (Costas, the PI).

**Lab Address and Access**

| | |
|---|---|
| *Website:* | https://arvanitis.gatech.edu/ |
| *Mailing address:* | Molecular Sciences and Engineering Building, 901 Atlantic Dr NW, Atlanta, GA 30318 |
| *Billing address:* | 311 Ferst Drive Northwest, Atlanta, GA 30318 |
| *Room & phone #:* | Main lab: 4135; Tissue culture: 4157A |
| | Costas (404-385-5373; 617-415-3754) |
| ***New member**:* | Prepare a brief Bio-sketch and ask Costas to add you to the lab members page. |
| ***Lab access:*** | To gain access to the lab send email to Vic Summey (email: vic.summey@chemistry.gatech.edu) with your GTID asking to grant you access to the lab (please ensure you CC Costas in your communication) |

# Expectations and Responsibilities

## Everyone

### Big Picture

Science is hard. But it's also fun. In the UBL, we want to make sure that everyone experiences a positive, engaging, hostility-free, challenging, and rewarding lab environment. To maintain that environment, we all have to do a few things.

- Work on what you're passionate about, work hard at it, and **be proud of it**.
- Scientists have to be careful. Don't rush your work. Think about it. Implement it. **Double and triple check it**. Incorporate sanity checks. Ask others to look at your code or data if you need help or something looks off. It's ok to make mistakes, but mistakes shouldn't be because of carelessness or rushed work.
- If you do make a mistake, you should definitely **tell your collaborators** (if they have already seen the results, and especially if the paper is being written up, is already submitted, or already accepted). We admit our mistakes, and then we correct them and move on.
- **It is never ok to plagiarize**, tamper with data, make up data, omit data, or fudge results in any way. Science is about finding out the truth, and null results and unexpected results are still important. This can't be emphasized enough: no academic misconduct!
- **Support your fellow lab-mates**. Help them out if they need help (even if you aren't on the project) and let them vent when they need to. Science is collaborative, not competitive. Help others, and you can expect others to help you when you need it.
- **Respect your fellow lab-mates**. Respect their strengths and weaknesses, respect their desire for quiet if they need it, and for support and a kind ear when they need that. Respect their culture, their religion, their beliefs, their sexual orientation.
- **Share your knowledge.** Mentorship takes many forms, but frequently involves looking out for those more junior.
- If you're struggling, tell someone (feel free to tell Costas!). **Your health and happiness come first**. The lab looks out for the well-being of all its members. We are here to help. It's ok to go through hard patches (we all do), but you shouldn't feel shy about asking for help or just venting.
- If there is any tension or hostility in the lab, something has to be done about it **immediately**. We can't thrive in an environment we aren't comfortable in, and disrespect or rudeness will not be tolerated in the lab. If you don't feel comfortable confronting the person in question, tell Costas. In any case, tell Costas.
- **If you have a problem with Costas** and are comfortable telling him about it, do! If you aren't comfortable, then tell another member of the department (for more serious issues).
- **Stay up to date on the latest research**, by using RSS feeds and/or getting journal table of contents. Also consider following scientists in the field on Google Scholar or Twitter
- Remember the lab philosophy: "We like to do good science and have fun. At the same time, but also separately". Have a life outside of the lab, take care of your mental and physical health, and don't ever feel bad for taking time off work.

### Small Picture

There are a few day-to-day things to keep in mind to keep the lab running smoothly.

- If you're sick, **stay home and take care of yourself**. Because you need it, and also because others don't need to get sick. If you're sick, reschedule your meetings and participants for the day (or the next couple of days) as soon as you can.
- Show up to your meetings; show up to your classes; and **show up to lab meetings**. You do not have to be in at 9am every day, but coming to the lab every day at or after 10 am is also not expected. You aren't expected to come into lab on weekends and holidays, and you aren't expected to stay late at night, but you need to realize there are times for staying late, and times for leaving early to go to the park and enjoy the sunshine.
- **Keep the lab tidy.** Put lab equipment back where you found it. Keep common areas uncluttered.
- **Dress code is casual** (and you can dress up if you want!) but not too casual. When interacting with colleagues or presenting your work, don't wear pajamas and sweat pants– but jeans are totally fine.
- **Be on time**. Especially when you are running experiments with others – in fact, show up 15-20 minutes early to debrief your colleagues to your part in the experiments, and be on time for your meetings: respect that others have packed days and everyone's time is valuable.

### Principal Investigator

All of the above and I promise to also…

- Support you (scientifically, emotionally, financially)
- Give you feedback on a timely basis, including feedback on project ideas, conference posters, talks, manuscripts, figures, grants.
- 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).
- Give my perspective on where the lab is going, where the field is going, and tips about surviving and thriving in academia.
- Support your career development by introducing you to other researchers in the field, promoting your work at talks, writing recommendation letters for you, and letting you attend conferences as often as finances permit.
- Help you prepare for the next step of your career, whether it's a post-doc, a faculty job, or a job outside of academia.
- Provide opportunities to practice and develop leadership skills.
- Care for your emotional and physical well-being and prioritize that above all else.
- I am always willing to change my attitude/approach on issues that you value (or need more support) and I might have underestimated. I encourage you to share your suggestions, comments, and/or feedback. I do believe that everybody has blind spots and talking about them is the only way to shed some light on them.
- Help resolve disputes in a timely manner.

### Post-Docs

All of the above (Big/Small Picture) and you will also be expected to…

- **Develop your own independent line of research.**
- **Help train and mentor students in the lab** (both undergraduate and graduate) when they need it – either because they ask, or because I ask you to.
- **Attend and present at lab meetings and journal clubs**.
- **Know the literature** related to your topic like the back of your hand and participate in paper revisions assigned to the PI.
- Present your work at departmental events, at other labs (if invited), and at conferences.

- **Apply for grants** (e.g., NRSA, K99). Though I will only hire you if I can support you for at least one year, it's in your best interest to get experience writing grants – and if you get them, you'll be helping out the entire lab as well as yourself (because you'll free up funds previously allocated to you). For funding opportunities see below.
- **Apply for jobs** (academic or otherwise) when you're ready, but no later than the beginning of your 3rd year of post-doc. If you think you'd like to leave academia, that's completely ok – but you should still treat your post-doc seriously and talk to me about how to best train for a job outside academia.
- **Challenge me** (Costas) when I'm wrong or when your opinion is different, and treat the rest of the lab to your unique expertise.

### Graduate students

All of the above (Big/Small Picture) and you will also be expected to…

- **Meet your graduate school reporting and exam requirements** (e.g., for your exams and thesis) -- and make sure Costas is aware of them!
- **Develop your dissertation research**. Your dissertation should have at least 3 substantial experiments that answer a big-picture question that you have. Much of your work has to be done independently but remember that others in lab (especially Costas!) are there to help you when you need it.
- **Know the literature** related to your topic like the back of your hand and participate in paper revisions assigned to the PI
- **Attend and present at lab meetings and journal clubs**.
- Present your work at departmental events, at other labs (if invited), and at conferences.
- **Seek out and apply for fellowships and awards** (e.g., NRSA or NSF grants). Help with grant writing. It's a valuable experience, and best to get it early. For funding opportunities see below.
- **Help mentor undergraduate students** in the lab when they need it – either because they ask, or because I ask you to. Undergrads can also help you collect data.
- Think about what you want for your career (academia – research or teaching, industry, science writing, something else), and talk to Costas about it to make sure you're getting the training you need for that career.
- **Prioritize time for research**. Coursework and TA-ing are important, but ultimately your research gets you your Ph.D. and prepares you for the next stage of your career.
- Schedule committee meetings on a yearly basis.
- Our Lab has a research rubric that will help you understand the expectations and what your performance/contributions need to be.

### Undergraduate Students

All of the above (Big/Small Picture) and you will also be expected to…

- Assist other lab members with data collection and analysis (unless you are working on your own independent project under the mentorship of another lab member, in which case you should work on that).
- Develop your weekly schedule by talking to your graduate student mentor or your post-doc mentor. You should be coming in every week, and scheduling enough time to get your work done.
- If you are earning course credit for research, you must also attend lab meetings when your schedule permits, and present at two of these lab meetings (one at the end of the semester).
- Students who have already demonstrated themselves to be careful and independent workers for a minimum of 3 months (i.e. have at least one dataset with appropriate statistical analysis applied to it to demonstrate robustness) may apply to do an honors project in the lab and for scholarships and paid internships. For more info see below.

# Code of Conduct

## Essential Policies

This is very important! As it was stated at the welcome page, the lab is dedicated to providing a harassment-free experience for everyone, regardless of gender, gender identity and expression, age, sexual orientation, disability, physical appearance, body size, race, or religion (or lack thereof). We do not tolerate harassment of lab members in any form. Sexual language and imagery is generally not appropriate for any lab venue, including lab meetings, presentations, or discussions.

## Scientific Integrity

*Research (Mis)conduct:* The lab and Georgia Tech, is committed to ensuring research integrity, and we take a hard line on research misconduct. We will not tolerate fabrication, falsification, or plagiarism. Read Georgia Tech's policies on the conduct of research carefully (main page here, institutional policy here, more information here).

*Reproducible Research:* If you gave someone else your raw data, they should be able to reproduce your results exactly. This is critical, because if they can't reproduce your results, it suggests that one (or both) of you has made errors in the analysis, and the results can't be trusted. Reproducible research is an essential part of science, and an expectation for all projects in the lab. For results to be reproducible, you should take extensive notes on *each step* of your analysis pipeline. This means writing down how you did things every step of the way (and the *order* that you did things), from any pre-processing of the data, to running models, to statistical tests. Additionally, your code should also be commented, and commented clearly. We all know what it's like to sit down, quickly write a bunch of code to run an analysis without taking time to comment it, and then having no idea what we did a few months down the road. Comment your code so that every step is understandable by an outsider. See also MATLAB's style guide in this link

## Authorship

Like other labs, we will follow the APA guidelines with respect to authorship:

> *"Authorship credit should reflect the individual's contribution to the study. An author is considered anyone involved with initial research design, data collection and analysis, manuscript drafting, and final approval. However, the following do not necessarily qualify for authorship: providing funding or resources, mentorship, or contributing research but not helping with the publication itself. The primary author assumes responsibility for the publication, making sure that the data are accurate, that all deserving authors have been credited, that all authors have given their approval to the final draft; and handles responses to inquiries after the manuscript is published."*

At the start of a new project, the student or post-doc taking on the lead role can expect to be first author (talk to Costas about it if you aren't sure). Costas will typically be the last author, unless the project is primarily under the guidance of another PI and Costas is involved as a secondary PI – then Costas will be second to last and the main PI will be last. Students and post-docs who help over the course of the project may be added to the author list depending on their contribution, and their placement will be discussed with all parties involved in the paper. If a student or post-doc takes on a project but subsequently hands it off to another student or post-doc, they will most likely lose first-authorship to that student or post-doc, unless co-first-authorship is appropriate. All of these issues will be discussed openly, and you should feel free to bring them up if you are not sure of your authorship status or want to challenge it.

# Lab Organization

## Lab Communication

We use email for communication. We also use slack that allows for easy tracking of messages compared to large email boxes. *Please talk to Costas to be invited to our slack channel.*

## Lab Notebooks

Lab notebooks are used to a) prove our discoveries (they are legal documents and belong to the University) and support our application for patents, b) protect our intellectual property, c) comply with guidelines for responsible conduct of research, d) comply with federal guidelines enforced in the grants that fund us on data management plans and requirements and e) can help organize digital data. We are using **OneNote** as electronic lab notebooks that are searchable, allow to link directly to raw data and we can re-use templates for our experiments. *Please talk to Costas about setting up your lab notebook.*

**Keeping a Lab Notebook**: Best Practices from NIH training office (15min presentation – follow the link)

## Lab Protocols

Our protocols are available in the internal google-sites website

- Guidelines for reproducible cell culture experiments:
    - Check mycoplasma: growth-rate and metabolism is affected
    - Keep track of passage
    - Keep track of cell morphology (some cell lines change after over confluency)
    - Keep your incubator, benches, space in the refrigerator, etc., clean and tidy.

## Data Storage

- Raw data are stored in Google Drive. Link to raw data is provided to LabArchives notebook
- Processed data can be stored in your device and backed up on LabArchives

## Lab Ordering

1. First please search the google sheet with recent order to see if someone has already ordered this item.
2. If we don't have the item, please list it in the google sheet.
3. Please talk with Costas about placing an order.

## Booking Equipment

To book the Verasonics system, the tissue culture room, Water tanks, and FUS system go to this link

## Hours

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 (e.g., your bed or Netflix). That said, hours in academia are more flexible than other jobs -- but you should still treat it as a real job (40 hours/week) and show up to the lab. To encourage lab interaction, try to be in most weekdays during 'peak' hours (assuming no other obligations) – e.g., between 9:30am and 4:30pm. This is not a hard rule, you can work at home occasionally, and I understand other obligations. But keep it in mind.

For graduate students, I understand having to be away for classes and TA-ing but show up when you don't have those obligations. I expect lab managers / research assistants to be in about 8 hours a day, starting around 9am and ending around 5pm.

### Vacation

The GaTech official vacation for Postdocs and Graduate students is two weeks. I will consider offering three weeks of vacation if annual deliverables are not compromised.

### PI Office Hours

In addition to weekly meetings (see below), and occasionally dropping by the lab, you can find Costas in his office. His door is usually open; if it is, feel free to ask for a chat. He will always say yes, though sometimes he can only spare a couple of minutes.

### Weekly Lab Meetings

Weekly lab meetings (~1.5 hours each) are meant to be a forum for trainees to present project ideas and/or data to get feedback from the rest of the group. Projects at any level of completion (or even not yet started!) can benefit from being presented.

Each trainee (RA, students, post-docs) is expected to present at least once every semester. These meetings are informal, and you can do what you wish with your slot – just be prepared to contribute something substantive. Lab members are also expected to attend every meeting (obviously, illnesses, doctor appointments, family issues, etc. are a valid reason for missing a meeting). Undergraduate students are encouraged to attend as often as possible (assuming it fits in their course schedule).

Occasionally, we may have joint lab meetings with other faculty in the department – these may be combined with our weekly lab meeting or an additional meeting. We will also use lab meetings (or ad-hoc scheduled meetings) to prepare for conference presentations and give people feedback on job talks or other external presentations.

### Individual Meetings

At the beginning of each semester, we will set a schedule for weekly meetings. Each full-time lab member (RAs, graduate students, post-docs) will have a one-hour slot per week set aside to meet with Costas (this hour can be split in 45 mins meeting at the beginning of the week and 15 mins quick update towards the end of the week). If scheduling conflicts arise (e.g., because of travel), we can try to reschedule for another day that week. If there is nothing to discuss, feel free to cancel the meeting or just drop by for a brief chat.

Costas will meet with undergraduate students every other week (or according to need); post-docs and graduate students should meet with their undergraduate mentee on a regular basis.

### Deadlines

One way of maintaining sanity in the academic work is to be as organized as possible. This is essential because disorganization does not just hurt you; it hurts your collaborators and people whose help you need. When it comes to deadlines, tell your collaborators as soon as possible when you know when a deadline is, and make sure they are aware of it the closer it gets. Do not be afraid to bug them about it (yes, bug Costas as well).

Give Costas at least one week's notice to do something with a hard deadline that doesn't require a lot of time (e.g., reading/commenting on conference abstracts, filling out paperwork, etc.). Give Costas ***at least*** two weeks' notice to do something with a hard deadline that requires a lot of time (e.g., a letter of recommendation). For manuscript revisions and invited paper submissions (which have hardish deadlines), give him as much time as you can, because these will require multiple back-and-forth.

For manuscript submissions (i.e., no hard deadline), you can still bug Costas to give you feedback if he hasn't responded in a week or two – papers are important!

### Presentations

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 Columbia), 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 will be available, and you can use those as much or as little as you'd like. Some general rules for posters should be followed: minimize text as much as possible (if you wrote a paragraph, you're doing it wrong), 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.

Costas is also happy to share slides from some of his talks if you would like to use a similar style. You'll get a lot of feedback on your talks in any case, but other people's slides might be helpful to you as you are setting up your talk. As with posters, feel free to go with your own style as long as it is polished and clear.

**Relevant resources**: How to present an effective poster presentation: BMES Webinar – follow the link

### Recommendation Letters

Letters of recommendation are extremely important for getting new positions and grants. You can count on Costas 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 if students or post-docs are applying for fellowships shortly after starting in the lab.

If you need a letter, notify Costas as soon as possible with the deadline (see Deadlines for guidance), your CV, and any relevant instructions for the content of the letter. If the letter is for a grant, also include your specific aims. 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 Costas' experience with you and anything else that has to be added. This will ensure that the letter contains all the information you need, and that it is submitted on time.

# Lab Resources

## Facilities and Equipment

*Available Facilities at IBB and EBB buildings*: Imaging (MRI, IVIS, CT, live cell microscopy, intravital microscopy, Fluorescence resonance energy transfer (FRET) and light sheet (Clarity) microscopy), Cell Cytometry, PCR and Next Gen Sequencing, Patch clamp (Intercellular, extracellular; cells, ex-vivo tissue, alive animals), Calcium imaging (cells, ex-vivo tissue, alive animals), animal (handling, breeding surgery, etc.).

*Available at ME (Invention center)/BME*: 3D printers, Laser Cutter, etc.

*Available at the lab:* Acoustic characterization/calibration equipment (Water tanks, 3D positioning system, hydrophones (Pressure), Scale and power meters (power), Oscilloscope), US and FUS systems (4 FUS systems: 0.8-2.4MHz, 1.02-3.5MHz, 0.5-1.7MHz, 2 MHz, 2 AWG, 2 Power amplifiers), Research array (Vantage 256 with AWG and entered power output) US imaging probes (1D and 2D arrays), MRgFUS system, Wet lab - BL2 (epifluorescence microscope, freezer/refrigerator, incubator, hood, etc.), Microfluidic device and tissue mimicking materials development (Plasma, Heater, chemical hood, etc.), Numerical modeling (In addition to software packages – see below - the lab has two high end computers and access to GaTech cluster)

**Dropbox:** https://www.dropbox.com/work/ME-DboxMgmt-Arvanitis-Costas

## Lab Software

- MATLAB: for image analysis and simulation
- COMSOL: Multiphysics modeling
- Microsoft Office: for presentations, excel, etc
- Zotero: for citations and keeping a library of journal articles
- Inkjet: for creating figures
- GraphPad: for bioinformatic analysis and heatmap plotting
- Autocad: for drawing microfluidic designs

Available from GaTech IT: https://software.oit.gatech.edu/

## Funding

- Giglio Family funds: Ultrasound Liquid Biopsy
- National Institutes of Health (NIBIB): (K99/R00) Controlled Delivery and Release of Chemotherapy in Brain Tumors with FUS
- Focused Ultrasound Foundation: Focused Ultrasound Immunomodulation in a Mouse GL261 Intracranial Glioma
- National Science Foundation (HMMI): Coupling skull-brain vibroacoustics and ultrasound toward enhanced imaging, diagnosis, and therapy
- National Science Foundation (LEAP HI): Investigation of coupled skull-brain vibroacoustics and ultrasound toward enhanced therapy and diagnosis
- Cure Foundation: Employing Focused Ultrasound to Aid Therapeutic Delivery to Pediatric Brain Tumors
- Ian's Friends Foundation: Focused Ultrasound Enhanced Chimeric Antigen Receptor T-Cell Therapy

### Collaborators

- Rakesh Jain, Ph.D., Harvard Medical School, Massachusetts General Hospital
- Levent Degertekin, Ph.D., Georgia Institute of Technology
- Alper Erturk, Ph.D., Georgia Institute of Technology
- Gabe Kwang, Ph.D., Georgia Institute of Technology
- Tony Kim, Ph.D., Georgia Institute of Technology
- Massimo Ruzzene, Ph.D., UC Boulder
- Hideho Okada, M.D./Ph.D., University of California San Francisco
- Dieter Haemmerich, Ph.D., MUSC
- Tobey McDannold, M.D., Emory University, Winship Cancer Institute
- Soma Sengupta, M.D., University of Cincinnati
- Daniel Pomeranz, Ph.D., University of Cincinnati
- Graeme Woodworth, M.D. University of Maryland
- Chetan. Bettegowda, M.D. Johns Hopkins University

## Research Dissemination

### Scientific Meetings

If you wish to attend a scientific meeting (and represent our lab by presenting your research), please make sure that at the time of the abstract deadline you ALSO have your PAPER ready for submission (or submitted).

Abstracts: Anyone submitting an abstract for a conference, symposium, etc. should clear this with me first, and circulate to all authors at least three days before the submission deadline.

Talks: Anyone giving a talk to a non-lab audience is required to give a practice talk to the lab at least one week before the real talk. If this is your first public talk on a lab project, plan on at least two practice talks (starting at least 2 weeks before the real talk). Practice talks should be mostly finished (final slides, practiced, and the right length) so that our comments will be as helpful as possible. Schedule one or more meetings with me ahead of time to plan or go over your slides, especially if you haven't given many talks before.

Posters: Anyone presenting a poster should circulate an initial version to all authors at least one week before the printing deadline. Use the lab Adobe Illustrator template so that our posters have a consistent look to them. If this is your first-time using Illustrator, make sure to leave plenty of extra time so you can learn how to use the software. Make sure to double check the poster size and orientation for the conference, and the size of the paper or canvas it will be printed on. For many conferences you will want to bring a sign-up sheet where people can request an emailed PDF.

List with scientific meetings that our lab presents regularly

- Society for Controlled Release (Submission Deadline: January 2020)
  - June 27-July 1, 2020, Las Vegas, Nevada, USA
- International Ultrasonic Symposium (Submission Deadline: March 18, 2020 )
  - Sep 7 - Sep 11, 2020, Las Vegas, Nevada, USA
- Acoustical Society of America (Submission Deadline January 6th, 2020)
  - 11–15 May 2020, Chicago, Illinois
- International Symposium of Therapeutic Ultrasound (Submission Deadline January 27th, 2020)
  - May 17 - 20, 2020, Gyeongju, South Korea
- International Symposium on Focused Ultrasound (Submission Deadline March, 2020)

  - November 8-12, 2020, Virginia, USA
- Annual BMES meeting
  - Oct. 14-17, San Diego, CE, USA
- Society for NeuroOncology (sometime in fall)
  - November 18-22, 2020, Austin, TX, USA
- Society for Neuroscience (sometime in fall)
  - October 24-28, 2020, Washington, DCUSA
- AACR (Submission Deadline Dec 5th 2020)
  - San Diego
- International Symposium on Nonlinear Acoustics (to be announced)
  - 2021, Oxford, UK
- Advances in Liquid Biopsies

**Your first scientific meeting**: Advice from NIH Training Office (15min presentation – follow the link)

### Travel Procedures

- Submit Travel Authorization: Send spreadsheet with estimated expenses to Joi Outlaw as early as possible, but no later than 3 weeks before the date of departure, or 4 weeks if applying for SGA/COE grant. Include transportation, accommodation, food, and conference registration expenses.
- Apply for Travel Funding:
  - SGA/COE Conference Funds: Georgia Tech Student Government Association and College of Engineering award grants of $250 each, $500 total if you are presenting at the conference. Grants are available once per academic year. Must apply 21 daysbefore departure & after travel authorization has been submitted. Application.
  - Acoustical Society of America Meetings:
    - ASA Travel Subsidy: ASA makes small travel grants paid directly to student at each meeting. Amounts are typically $100--$200, depending on volume of applications. Applications due several weeksbefore conference, check acousticalsociety.org for details. ASA Site
    - NCAC Travel Grant:The National Council of Acoustical Consultants offers grants of$500 toward costs of attending ASA meetings. Application due about one monthbefore conference. NCAC Site
  - CRIDIC Poster Competition:Annual poster competition for all graduate students held in late January or early February, with abstracts due in December. Prizes from $500--$2000are awarded to support conference travel. CRIDIC Information
- Make ArrangementsIt's simplest to book your own flights and hotels and submit for reimbursement after. If the amount is too large for you to pay directly, you can request that Georgia Tech make the purchase for you. Avoid this if possible, as it increases the number of signatures required and makes the process a bit slower and less flexible.
- Keep All Receipts During Travel
- Submit Reimbursement Email spreadsheet with actual expenses and receipts to Joi immediately upon return.

### Manuscripts

#### General

- Always show a manuscript (or revision) to all authors before submit-ting it, giving them the opportunity to comment.

- Go over page proofs carefully, including the references. There is almost always a mistake (ours, or introduced by the publisher)
- Always give the senior author the opportunity to look at page proofs.

## Formatting

When you are out in the big world on your own, you are free to format your manuscripts however you like. When sending me a draft of a manuscript, please do the following:

- Use word format, include page numbers, and have track changes on.
- Include the full author list starting from the first draft, which helps clarify any authorship issues or concerns early on.
- Include placeholders for all sections (i.e., introduction, methods, results, discussion, etc.) even if they are empty, so that we can fill them in as we go. Having placeholders also helps clarify the organization from the beginning.
- Use styles, especially for headings. This will help organization of the manuscript and make it easy to change font and formatting if need be.(To make a heading, don't simply select the text and make it bold; select the text and then a heading style, such as "Heading 1".)
- While we are sending drafts back and forth, keep the text single-spaced. If the journal requires double spacing, we can add this at the end.
- Embed Figures and tables in the body of the manuscript rather than putting at the end, or in separate files. Again, we can change this to match journal guidelines before submitting if need be. It's much easier to read and comment on a manuscript if I don't have to switch back and forth to different files for tables and figures.

**Effective figure preparation**: Elife - Creating effective figures (follow the link)

## Journal Club

We have a monthly journal club. The journal club can also be used to talk about methods, statistical analyses, new papers, and career development. For paper discussions, everyone must come to lab meeting having read the paper and prepared with comments and questions to contribute. Some weeks we may explore a particular issue and have people read different papers – in that case, come to lab meeting having read your paper and be prepared to summarize it for the group. Note that if you lead a journal club you are not supposed to defend the paper presented but to facilitate conversation and provide your input and understanding on the subject matter. Every lab member monitors 2 journals and update us bi-weekly on new relevant articles published. Ask Costas for advice on how to present a paper during journal club. See below for list of journals.

IEEE journals (TMI and UFFC), JCR, Theranostics, Small, ASA, UMB, Cancer Research, PNAS, Nature (BME, Communications, etc.), Science (Advances, Translational Medicine, etc.), Physical Review Letters.
**Reading a scientific paper:** Advice from NIH Training Office (15min presentation – follow the link)

## Lab Safety & Training

**General biosafety training requirements by the EHS (Environmental Health & Safety):**

- EHS trainings website link: https://www.ehs.gatech.edu/training.
- Required training:
    - General Biosafety Training (https://www.ehs.gatech.edu/biosafety/training)
    - Lab Safety 101 (https://www.ehs.gatech.edu/chemical/training)
    - Right to Know (RTK - https://www.ehs.gatech.edu/rtk)
    - Bloodborne Pathogens for Researchers https://www.ehs.gatech.edu/biosafety/training)
    - Recombinant DNA Training (https://www.ehs.gatech.edu/biosafety/training)

**Additional Training Requirements for Handling Animals (animal protocol):**

- Enroll in Occupational Health Program (fill out the form and submit it via email or to the Biosafety Office) http://www.ehs.gatech.edu/biosafety/bohp and look for *how to enroll*.
- Citi training for animal protocols https://www.citiprogram.org/ , then go to "log in through my institution" on the right and select Georgia Tech. Complete the following as needed:
    - Investigators, Staff and Students (Working with IACUC) – everyone
    - RCR Basic Course (with Animal Research Module) – everyone
    - Aseptic Surgery (if you are doing surgery)
    - Working with Mice in Research Settings
    - Working with Rats in Research Settings
    - Post-Procedure Care of Mice and Rats in Research: Reducing Pain and Distress
    - Any other relevant to your protocol (Rabbits, pigs, etc.)

**Other Trainings**

- Email Andrea C. Gibson (email: andrea.gibson@prl.gatech.edu) to gain access to animal facilities.
- Cleanroom training (if you want to use DLS, UV-Vis, etc) http://cleanroom.ien.gatech.edu/join/
- PRL Orientation (for those who need access to animal facilities) – usually held every week.
- X-Ray Safety: https://www.ehs.gatech.edu/radiation/xray/training

**Required for GT doctoral students:**

- Responsible Conduct of Research (RCR) training: (1) online CITI RCR training and (2) in-person RCR training either through PHIL 6000 or an approved "in-house" doctoral RCR training approach.
- For general information on RCR training for doctoral students: www.rcr.gatech.edu/doctoral.

**Other useful links / contact info (note that these people may have left GT since this list was compiled):**

Environmental Health & Safety - http://www.ehs.gatech.edu/
Meagan Fitzpatrick (biosafety) meagan.fitzpatrick@ehs.gatech.edu
Ryan Lisk (chemical) ryan.lisk@ehs.gatech.edu

Institutional Animal Care & Use Committee - IACUC@gatech.edu
Anna Marie Lee annamarie.lee@gtrc.gatech.edu

Histology Core
Aqua Asberry (lab manager) aqua16@gatech.edu

Magnetic Resonance Imaging Core
Johannes Leisen (manager) johannes.leisen@chemistry.gatech.edu

Optical Microscopy Core
Andrew Shaw (manager) andrew.shaw@ibb.gatech.edu

Animal facility
Dr. Laura O'Farrell vet@gatech.edu or laura.ofarrell@gtrc.gatech.edu
Dr. Richard Noel richard.noel@gtrc.gatech.edu

IBB Animal Facility Manager (Animal transfers, cell line testing, room availability, etc.)
Kimberly Eanjamin kim.benjamin@ibb.gatech.edu (may have changed)

## Additional Resources

- Career coaching for scientists (follow the link)
- Handling Your Imperfect Adviser (follow the link)
- Making the Right Moves (follow the link)

**Funding opportunities for lab members** (follow the links)

Summer Internships

- PURA
- FUS Foundation Global Internship Program

Fellowships for GRAs and PhD Students

- NSF Graduate Research Fellowship Program (GRFP)
- NIH – F31 Graduate Research Fellowship
- Winship Cancer Institute
- NDSEG Fellowship
- The Paul & Daisy Soros Fellowships for New American
- The National GEM Consortium | GEM Fellowship Program
- NATIONAL PHYSICAL SCIENCE CONSORTIUM
- USAID Research and Innovation Fellow
- Fannie & John Hertz Foundation
- AAUW International Fellowship
- Society of women engineers
- China Scholarship Council Graduate Scholarship Program

Fellowships for Postdocs/Research Fellows

- NIH – F32 Research Fellowship
- NIH Research Career Development Awards
- Burroughs Wellcome Fund: Career Awards at the Scientific Interface
- Prevent Cancer Foundation
- American Brain Tumor Association
- Rally Foundation
- James S. McDonnell Foundation

Several funding opportunities can also be found at Trialect

Support on grant writing.

- NIH grant samples & more
- NIH grant writing tips

# Appendix: Performance Rubric

| Category | Excel | Satisfactory | Deficient |
|---|---|---|---|
| Drives Research | Drives Research several steps ahead in both thinking about and planning the project, resulting in executable new ideas/experiments | Leading the discussion/project, understands that "knowing how to get it done" is different from "getting it done" | Lagging behind advisor and team members in thinking about, planning, or executing project, showing little thought regarding execution, exhibiting poor follow-through after idea generation |
| Uses meetings effectively | Uses the agenda to take big steps forward, uses the meetings to answer critical questions and make decisions | Sets agenda and uses the meeting to inform and set short term plans | No agenda, unprepared for meetings, unable to lead conversation, unable to communicate relevance and content of work effectively |
| Displays continuity of research | Effectively manages continuous progress on project while initiating new ideas/experiments that don't distract | Effectively manages continuous progress on project | Easily distracted or thrown off course, little or no continuity to research |
| Has clear short and long term plans | Always working from a clear short term plan with a focus on agreed upon priorities, also able to keep long-term plan in focus | Works from short-term plan with purpose | No clear short-term plan, or off-track with plan, unable to balance short and long-term |
| Exhibits major progress since last evaluation | Carefully considers comments from last evaluation, and worked to improve in most if not all areas | Worked to eliminate deficiencies | Previous evaluation seemed to have little or no impact on work |
| Is on track with department requirements | Meets all previous requirements, and has a clear plan for the next year's requirements | Meets all requirements | Has procrastinated or is unaware of requirements |
| Works well collaboratively within group | Clearly takes advantage of group, sees opportunities for new projects/ideas with others that do not distract main project | Works well in teams and communicates progress and ideas effectively within team | Unable to work with others, poor communication, not taking advantage of strengths of group |
| Uses time effectively | Very efficient in work, able to get things done, and still have time to think creatively | Usually works efficiently, and gets things done | Poor judge of how long things take, can't manage priorities, inefficient use of time |
| Effectively couples experimental and theoretical concepts | Creates a clear interplay between experimental and theoretical, and uses one to propel the other | Has a clear description of project in terms of both empirical/experimental and theoretical | Focuses on one without regard for the other, unable to express technical ideas |
| Displays effective knowledge and use of literature | Completely on top of relevant literature, constantly identifying new relevant literature without being distracted | Aware of most relevant literature, incorporates into write-ups and reports and group meetings | Seems largely unaware of relevant literature or defines "relevant" in too narrow a focus, unable to remember other authors' names, or where ideas came from |
| Effective with data collection, storage, documentation | Data well organized, backed up, available at a moment's notice, all work well documented, and new analyses easily generated | Data well organized and backed up | Data poorly organized, unaware of how much data is available, sitting on unanalyzed data, difficult to find data, poor documentation |
| Solicits feedback from larger community | Talks to anyone who will listen, for both feedback and informing the community about the work | Talks to committee members, and group members about work, gives dept./division Talks | Doesn't communicate research within group or outside group, only feedback is from advisor |
| Communicates well | Effectively uses written documents and presentations to convey ideas, good at distilling complex ideas and focusing on important points, persuasive in arguments | Proficient in written documentation and presentations | Fails to turns ideas into digestible written documents, arguments confusing and/or not persuasive |

**Lab Manual Signature Form**

I confirm that I have read the lab policies laid out in the UBL manual. I raised any questions or concerns about them with Dr. Costas Arvanitis, and those discussions have alleviated my concerns and answered my questions. I agree that I will abide by the policies set forth in the manual.

Printed name: _____ Lab Role: _____

Signature: _____ Date: _____