



Frequently Asked Questions (FAQs) for Joining a Lab in the Georgia Tech School of Chemistry and Biochemistry for Master's and Ph.D. students

Contacts

For questions, concerns, or comments related to this document please contact:

Dr. Kenyetta Johnson Taylor, Director of Graduate Studies School of Chemistry and Biochemistry
kenyetta.johnson@chemistry.gatech.edu

Dr. Facundo Fernández, Associate Chair for Research and Graduate Training
facundo.fernandez@chemistry.gatech.edu

Dr. Andrew McShan, Assistant Professor; wrote the template for the FAQ document
andrew.mcshan@chemistry.gatech.edu

Purpose

Graduate students have many questions and concerns on their minds when choosing which labs to join for their master's or Ph.D. research. This frequently asked questions (FAQ) document is aimed at addressing many those questions. Principal investigators (PIs - the people who “run the labs”) may choose to use this document to give prospective students a sense of how their lab is structured and to provide insights into their mentoring style and expectations. Please note that this document *not* meant to be a contract or agreement. This is mostly because some PIs have expectations and mentoring styles that are tailored to a specific student based on their short and long-term career goals. Moreover, some PIs may be extremely flexible and allow students to set their own expectations if they so choose.

General recommendations for choosing a lab / mentor to do your thesis research with:

- Do your homework on the type of research going on in the School of Chemistry and Biochemistry. Visit each faculty's website to learn about what they do: <https://chemistry.gatech.edu/faculty>
- Pay attention in the CHEM 8001 course (Faculty Seminar) required for all first-year students. Here, you will see a lot of short presentations (~25 minutes) from faculty who are looking to recruit new students. What aspects of those talks stand out to you? Was the science cool? Were the methodologies radical? Where you inspired by the presenter's passion? Could you see yourself doing that sort of research for 4 to 5 years?
- Choose a lab whose research program and topics contain elements that you're passionate about. This could be the scientific problem (*i.e.*, how does catalysis work vs what are natural

products made by marine sponges vs how do proteins misfold to cause disease), the field of study (biochemistry vs inorganic chemistry vs analytical chemistry), or techniques employed in the lab (total organic synthesis vs NMR vs mass spectroscopy vs computational biology). You will spend years of your life performing research (often monotonously), so don't choose a lab whose research makes you go "meh". Work on a research problem that lights a fire under you! Work on a project that makes it difficult to sleep at night because you're so excited and motivated to solve those problems (obviously, do get sleep though).

- Choose a lab where the climate and environment of the lab fits your specific needs. If you haven't worked in a lot of different labs this might be difficult to answer. However, review the list of questions below (in the FAQ) and ask yourself what your answers to those questions might look like versus what the PI tells you. Talk to other students with more research experience, if needed. How did they choose a lab? Trust your gut.
- Choose a PI who can mentor you in the way you'd like to be mentored. Again, think about how you've liked to learn in the past. Are you more of a hands-on learner who needs someone to show them things directly, or are you the type who loves to figure things out independently?
- Choose a PI who can communicate their expectations to you clearly. Choose a PI who will be flexible or semi-flexible to your needs. Choose a PI who will care about you as both a researcher, *and* as a person. Choose a lab where the expectations and goals of the PI align with yours (see below FAQ). Or, alternatively, be flexible in adjusting your own expectations to match the PI so long as the research is cool enough to do so.
- Talk to current members of your potential lab (undergraduates, graduate students, post-docs, research scientists) to get a more detailed view of the research, lab climate, and PI. When possible, choose a lab that has lab members you could hang on with. You will be around these people all day every day. You don't want to join a lab where people do not ever communicate with each other or help each other out with research. In addition to friends in your graduate cohort, you will need a lab community that will support you to get through research without feeling lonely or isolated. For people who come from marginalized backgrounds, consider joining a lab that has diversity in the type of people in the lab (including the PI and other graduate students).
- Choose a lab in a city / state / country that you can imagine yourself living in, such that you will be able to engage with your hobbies and interests outside of the lab. There are many cool things to do in Atlanta: <https://discoveratlanta.com/50fun/main/>
- Once you have a few candidate labs you're interested in joining, send a personal e-mail to the PI. Explain your background and why you're interested in their lab; why would you be a good fit for that lab? The e-mail needs to be personalized and show you did your homework. PIs really dislike blanket e-mails where there's no evidence the student did anything to understand the lab's research. Your goal is to set up a one-on-one meeting where you can discuss some of the FAQs noted below.

Bad example:

Dear Professor,

My name is Billie. Having read through your profile and your area of research I wish to undergo a PhD in your research area. I believe I can work with you to the best of my capacity. Attached to this mail is my CV.

Thanks.

Good example:

Dear Dr. McShan,

My name is Billie Eilish. I'm a first-year graduate student in Chemistry and Biochemistry at Tech. I ran across your website on the faculty page and was really fascinated by your research, especially the work you're doing on lipid transfer proteins and protein design. I read your recent paper entitled "Utility of methyl side chain probes for solution NMR studies of large proteins" and it got me really excited about the potential of learning NMR during my PhD. I haven't done any NMR in the past, but I do have experience making recombinant membrane proteins during my undergraduate work with Chuck Sanders at Vanderbilt. I think work in your lab could help prepare me for my eventual goal of working as a biochemist in industry.

Let me know if you have any openings in the lab, and if so if we could meet to talk about ongoing projects and a potential rotation.

Thank you!

Best, Billie

- Be aware that some PIs might want you to have previous experience in the field of research or type of techniques used in their lab. Try not to take this personally. Other PIs don't care about your background, but care more that you are motivated, passionate, and inquisitive.

THE BELOW FAQ IS FOR THE **MCSHAN LAB IN THE SCHOOL OF CHEMISTRY AND BIOCHEMISTRY**

PI contact info:

Andrew McShan, Ph.D.

Pronouns: They/them

Assistant Professor

School of Chemistry and Biochemistry

Molecular Sciences and Engineering Building (MoSE)

Georgia Institute of Technology, Atlanta, GA

Office location: MoSE G022

Office Phone #: (404) 385-6052

E-mail: andrew.mcshan@chemistry.gatech.edu

Website: <http://mcshanlab.com/>

MCSHAN LAB FAQs

- *How did you get into science?*

I got into science as a kid from watching shows like Cosmos, Bill Nye the Science Guy, the Magic School Bus, Planet Earth, Star Trek, and Dexter's laboratory. I started wanting to do research after joining robotics club in middle school / chemistry club in high school and competing in the U.S. National Chemistry Olympiad.

- *Where did you get your degrees/research training and what is your scientific background?*

I earned a B.S. in Biochemistry from the University of Kansas where I carried out undergraduate research in epigenetics in the lab of Dr. Justin Blumenstiel. I loved research (but wasn't the best at genetics) so I switched to biochemistry research because I thought I could develop new therapeutics by studying the structure and function of biomolecules. I obtained a Ph.D. in Molecular, Cellular & Developmental Biology at the University of Kansas in the lab of Dr. Roberto De Guzman studying the structure, function, and inhibition of bacterial type III secretion systems using NMR spectroscopy. During my Ph.D. I received a NIH T32 biotechnology training grant, which allowed me to do an industry internship in the lab of Y. John Wang at Genentech in the field of drug formulation. I then did a postdoctoral fellowship with Dr. Nik Sgourakis at the University of California, Santa Cruz studying classical antigen presentation and T cell receptors using NMR spectroscopy and X-ray crystallography. Our lab moved during the pandemic (that sucked), and I did another postdoctoral fellowship with Dr. Nik Sgourakis at the Children's Hospital of Philadelphia & The University of Pennsylvania studying non-classical antigen presentation using NMR spectroscopy and computational biology.

- *How long have you been at Georgia Tech?*

I joined Georgia Tech as an Assistant Professor in July 2022. I'm still a newbie!

- *Are you taking students right now?*

Generally, I am always looking for graduate students who are excited about our lab's research themes. Let's talk! However, there may be times when I cannot take you due to space, time, or funding limitations. If you end up joining another lab, I will still be happy to collaborate with you and support you when possible. If you like my "vibes" feel free to ask me to be on your thesis committee.

- *What kind of students do you look for?*

I typically look for individuals that display the following qualities: kindness, creativity, open-mindedness, ambition, perseverance, organization, passionate, self-motivated, inquisitive, and hardworking; interests in biochemistry, biomolecular structure; computational biology; immunology, and human health; someone who I can vibe with where communication is easy, frequent, and transparent; someone who wants to grow as a scientist and as a person; someone who is not afraid to fail (since 80% of what we do will likely fail, but we keep going despite that!); someone who will challenge me and challenge themselves intellectually.

- *Would you be interested in co-advising?*

Most students are not co-advised. However, under the right circumstances, co-advising can be a really great experience for all parties involved. Usually, co-advising makes the most sense when the project calls for interdisciplinary science at a conceptual or technical level. If you have an idea for a co-advised project, let's discuss it. Both PIs and you need to have a discussion to see if it could work.

- *What projects are going on in the lab currently?*

Currently projects going on are (as of Fall 2023):

- Studying the structure and function of lipid transfer proteins. Our studies will expand upon the role of lipid antigens in human health as deficiencies in many LTPs result in lipid storage diseases (MTP - Abetalipoproteinemia, GM2AP - GM2-gangliosidosis aka Tay-Sachs and Sandhoff disease, NPC2 - Niemann-Pick disease, FAAH - Fatty acid hydroxylase-associated neurodegeneration, Saposins - Metachromatic leukodystrophy and Gaucher disease).
- Studying the structure and function of the CD1 family of non-classical major histocompatibility complex class I (MHC) related proteins, which present both self and foreign lipids to $\alpha\beta$, $\gamma\delta$, and natural killer T cells. Examples of CD1 complexes involved in the adaptive and innate immune response to human disease include those associated with lipids derived from cancerous cells (Leukemia, Carcinoma, Lymphoma, Melanoma), wasp/bee venom including yellowjackets of the genus *Vespula* who represent Georgia Tech's mascot Buzz (Hymenoptera venom allergy), bacterial pathogens (*Mycobacterium tuberculosis* - Tuberculosis, *Borrelia burgdorferi* - Lyme Disease, *Pseudomonas aeruginosa* - Pneumonia), viral pathogens (HSV-1 - Herpes, HBV - Hepatitis B), marine sponges, and self-cells in autoimmune disease (Dermatitis, Psoriasis, Lysosomal Storage Disease).
- Understanding immune responses to Malaria through recombinant expression, in vitro refolding, and X-ray crystallization of peptide/MHC immunoreceptors as well as "hunting" for the T cell receptors that recognize them
- *De novo* protein design / engineering of inhibitors of pathogens infection and autoimmune disease.

We are also engaging with several collaborative studies with other labs at Georgia Tech and beyond.

- *Are there any specific courses that students in your lab take?*

Graduate students in my lab typically take:

CHEM 6501 Biochemistry I

CHEM 6573 Molecular Biochemistry

CHEM 6762 Protein Engineering

CHEM 6572 Macromolecular Structure

CHEM 6582 Biophysical Chemistry

CHEM 6765 Drug Design, Development and Delivery

- *Do you tend to give your students projects or have them select their own?*

I will usually give new students a project to start off with while you learn techniques in the lab and learn how to be an effective researcher. You will always have a choice in what project you're involved in, and usually a few potential projects are suggested. Eventually, the aim is to develop a project *together* with you where you have more independence and agency. These projects usually will fall under the scope of the research goals of the lab, but under special circumstances they could deviate. In reality, our funding and expertise will dictate what projects we can carry out.

- *How many lab members do you currently have, and what type of student are they?*

We currently have four Ph.D. students (from Chemistry and Biochemistry), two master's students (from Biomedical Engineering), and a bunch of undergraduates (Biochemistry and Biology majors). Our students come from all types of backgrounds, both culturally and research expertise wise. All current and alumni lab members are listed on our website, <http://mcshanlab.com/>.

Please reach out to these lovely people to ask them questions about the lab and my mentoring style.

- *What kind of techniques will I learn during my time in the lab?*

You will be expected to learn both web lab (experimental) and dry lab (computational techniques), as well as learn how to integrate them.

From our website:

“The McShan lab is not focused on any particular approach or technique, although we are particularly fond of solution nuclear magnetic resonance (NMR) spectroscopy. We strive to solve outstanding biological questions with relevance to immunology, medicine, and pathology. Trainees joining our lab will gain hands on experience in biochemical/biophysical characterization of protein-protein and lipid-protein interactions (surface plasmon resonance, isothermal titration calorimetry, hydrogen/deuterium exchange mass spectroscopy), structural biology (solution NMR, X-ray crystallography, cryo-electron microscopy), computational biology (Rosetta modeling, molecular dynamics simulations), protein design/engineering, chemical biology, and immunological assays.”

- *What kind of mentoring style do you have?*

I am generally more of a “hands on” type of mentor. My goal is to train all members in the lab one-on-one as much as possible. However, realistically that is not possible since my time is limited. I will still do my best. I am a very empathetic person. I have a very bubbly personality, which some people may not enjoy. I'm an advisor, a protector, an advocate, a mentor, a connection broker, a cheerleader, and an affirmer. I always try my best to be an inclusive mentor who is aware of your needs and learning style. I will listen to you and respect you. I will try to adjust by mentoring style based on your specific needs. Figuring that out takes some time / effort on both ends and requires effective communication.

- *How often do you meet with your students?*

Usually, meetings with students will be very informal and occur frequently. You can expect that I will check in with you somewhere between daily and weekly, depending on how packed my schedule is. I will usually ask how you're doing, ask if you need anything, and ask to see any new data. This isn't meant to make you feel pressured. It is a means to provide an opportunity to discuss any progress, bottlenecks, confusion, or problems that we could address one-on-one. I will try to allow you to set your own goals and timelines, but sometimes I need to intervene to keep progress in motion. We will have more formal one-on-one meetings a few times a semester to discuss your career goals and other topics. These formal meetings will include discussion of individual development plans, career goals, classes you're taking, plans for conferences, upcoming grant opportunities, etc. If formal weekly meetings would be useful for you, we can arrange that. If I bug you too much, please let me know.

- *What are your expectations for hours in the lab?*

I expect graduate students to be in the lab at minimum 10 am to 6 pm Monday to Friday. Hours in the lab are set such that you have enough time to get your work done. However, I am also sympathetic that you have other commitments, such as classes and studying for lit exams/candidacy, etc. It's also

important to me that you're able to maintain a work-life balance for your relationships, hobbies, and mental health.

In general, you can expect the following time commitments in the McShan lab:

Rotation Students – 25 to 35ish hours per week

Master's Students – 25 to 35ish hours per week

Ph.D. Students – 40 to 50ish hours per week* *depends greatly on what year of study you're in

You will not be asked to stay late or come in on the weekends unless the specific experiment requires you to do that (usually, we can design it such that it doesn't). 4th and 5th year students work a little harder than beginning students to meet the high demands to publish and graduate. As always, feel free to discuss work hour expectations with me.

- *How many papers will I be expected to publish?*

We really want you to get papers out of your research! I will try my best to design projects in a way where this is achievable. Expectations for numbers of papers depends a lot on the field of research, the impact factor of the journals you're submitting to, the difficulty of your specific project, and how much effort you put in your research. Where we submit your paper will depend on what story your data tells. For Master's students, aim to publish at least 1 first author paper and 1 middle author paper. For Ph.D. students, aim to publish around 3 first author papers and a few middle author papers.

- *How is the lab structured? How do you envision collaboration between students?*

I attempt to structure the lab such that no projects are completely overlapping, although they might be related to each other, especially because we're just getting off the ground. You will be expected to collaborate with our lab members frequently, as well as others in the department. You will likely be asked to mentor another lab member at some point.

- *Is there funding currently available for me? Will I have to TA?*

As a new lab, we are currently supported solely through limited startup funding. For now, most graduate students will be expected to TA for a few semesters (usually the 2nd and 3rd years). I will also encourage you (and help you) to apply for your own funding. Summers you will be paid as GRA when possible. Once I get NIH or NSF funding, I will begin to support lab members via GRA in order of seniority. If you have concerns, discuss them with me. The funding climate is harsh. Please be patient with me as I work on getting us funding.

- *Do you do any lab building activities?*

Yup! We try to have lab lunches, lab dinners, and other types of lab community activities each semester. Karaoke, bowling, movie nights, and arcades are some ideas. The last thing we did as a lab was go see the Barbie movie!

- *Will I be able to attend scientific conferences?*

Yup! You will be encouraged to attend scientific conferences, especially when you have data to present. You and I will work out the best conferences to attend based on your research and career goals.

Examples of conferences related to our work:

- Biophysical Society Annual Meetings

<https://www.biophysics.org/upcoming-annual-meetings>

- ENC - Experimental Nuclear Magnetic Resonance Conference

<https://www.enc-conference.org/>

- American Association of Immunologists Annual-Meeting

<https://www.aai.org/Meetings/AAI-Annual-Meeting>

- Protein Society Annual Symposium

<https://www.proteinsociety.org/annual-symposium>

- RosettaCon

<https://www.rosettadesigngroup.com/rosettacon/>

- *How do you help students achieve their career goals?*

I will ask all lab members to engage with Individual Development Plans each semester. I will also work with you to figure out what career goal works for you. I will design your research in the lab in a way that is tailored to help you pursue your career goals and be a competitive applicant. When possible, I will actively help you apply for jobs and make job contacts for you. I will write you great letters of recommendation when I can – I will explicitly tell you if I cannot write you a good recommendation for any reason. I will support your career goal no matter what you decide to do. There are SO many more jobs than just academia or industry (see: <https://gpchemist.acs.org/career-paths/best-nontraditional-careers-for-chemists.html>). My advice is do what you love and do what makes you excited.

- *Where do students go after they graduate your lab?*

Students I have worked with in the past have gone on to a variety of successful jobs. Some stay in academia – going onto graduate school or postdocs (when they didn't think they would!). Some go onto industry jobs (for example, at Merck or Johnson and Johnson). I will do my best to prepare you for whatever career goal interests you.

- *Will I be able to partake in an internship if I want to?*

Most likely, yes. I will try to help you get an internship if that is useful for your career goals. The timing of the internship is important, and we can discuss that when appropriate. I am working on obtaining a network of colleagues who can provide internship opportunities.

- *Can I see the office space / lab space?*

Yup! We're in MoSE G125. I will give all new and prospective students a tour of our lab and our office space, as well as a tour of the NMR and X-ray crystallography facilities.

- *Are there lab meetings or journal clubs?*

Yup! We have weekly lab meetings during Fall and Spring semesters. During some lab meetings, a lab member will present their most recent research findings (or their plan for research). During other lab meetings, a lab member presents a paper from the literature. All lab members, including undergraduates and even me, are expected to present, participate, and ask questions.

- *What are your views and your lab's views on DEI?*

I am a queer, non-binary scientist (my pronouns are they/them) so DEI is extremely important and personal to me. Please see more info about our DEI values on our website (<http://mcshanlab.com/>)

- *How often do students take time off for vacation?*

You will be allowed around 2 to 3 weeks of vacation per year (set by Georgia Tech – not me). I'm a very flexible PI, but do not take advantage of that please. Discuss with me when you will be gone as soon as you know you will be leaving (not after the tickets are booked!).

More example questions here:

The Definitive 'what do I ask/look for' in a PhD Advisor Guide

<https://www.cs.columbia.edu/wp-content/uploads/2019/03/Get-Advisor.pdf>

Interviewing with potential Ph.D. advisors

<https://graduate.rice.edu/news/current-news/interviewing-potential-phd-advisors>