# Thinking About Graduate School in Biology: Our Tips for Success

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# What to start thinking about as an undergraduate

## Preparing for life as a graduate student

When you are a graduate student, you will be doing research and possibly also teaching full-time. It's best to get research experience before graduate school, both so you know what you're getting into and because it makes your application more competitive. Getting experience as a teaching assistant (TA) as an undergraduate is helpful, but way less important than research experience.

## Finding an undergraduate research lab

As you build your research experience, we recommend that you try out different fields so you can figure out what you're interested in. BUT, if you find a lab that you really like working with, it's OK to stick with that! If you work in the same lab for long enough, you might have the opportunity to present your research at a conference while you are an undergraduate, which is very helpful. If you don't find a lab that works at first or second or third try, that's okay, part of the experience is figuring out what you don't like as well. Please note a lab does not necessarily mean a space full of chemicals and reagents, in this sense it refers to the group of folks working on similar or parallel research projects.

## Get to know professors you admire and get along with

You will need professors to write you letters of recommendation for graduate school. They can also serve as mentors who can help you with the graduate school application process. However, they can only do this well if they know you as more than a name on a class roster. If you're in a big class, the best way to do this is to go to office hours. If you're in a small class, make sure you participate in class. You can talk to your professors after class about their own research interests, and don't be afraid to ask if you can do research with them! If they say yes, it's OK to ask if it is a paid position. Unfortunately, many are not (which is a serious equity issue), but you'll never know unless you ask. After you are done with their class, stay in touch via e-mail or visits to their office.

NOTE: Keep in mind a professor also refers to TAs, or graduate students you encounter as your instructors. Graduate students can also write really great letters of recommendations and are a great conduit to introducing you to their lab and advisor/s. They are near peers and often serve as great mentors who can help you navigate your academic journey. Don't be afraid to ask questions and ask them about their journeys. They were very recently in your shoes wondering, how to apply to graduate school, what to study, what questions to ask, what area to live in, what to tell their family they were going to spend the next 2 to 6 years doing given they were a first generation student, or a student from a minoritized or marginalized background in STEM.

## Decide if you need a graduate degree

Graduate degrees can open some amazing doors for people, especially members of traditionally marginalized or minoritized groups. However, many graduate students are not paid well during that time of their life, have to move away from family to pursue opportunities, and experience mental health issues. If your career goals require an advanced degree like a Master’s, Ph.D., Ed.D., or M.D./D.O., then all those things might be worth it. But many people have really rewarding careers in STEM without having an advanced degree. Seriously think about what you want to achieve professionally and your motivations for going to graduate school, but don’t let anyone tell you that you shouldn’t go to graduate school if you decide it’s right for you. You are the only person qualified to make that decision. Think about what problem you want to tackle, and if graduate school is the place to do this.

# How to Identify and Contact a Potential Graduate School Advisor (Primary Investigator, PI)

## Step 1: Research Interest

- Figure out what research you’re interested in and who is doing it - the easiest way is to go to conferences if you can find funding
    - There are conferences for many disciplines, just google your topic of choice and conferences and see what professional societies and conferences come up
        - Ex: Vertebrate Paleontology Conferences - Society of Vertebrate Paleontology, Geological Society of America, etc.
    - Funding may be available through your institution
    - Some conferences have grants for new students, and many more have popped up since 2020 as societies try to foster more inclusive spaces given the inequities in STEM as a result of varying systems of oppression.
- If you can’t go to conferences, read the program and abstracts books for conferences you’re interested in
    - These can be found online once the conference is over.
    - You can also follow conference tweet threads and reach out to individuals.

## Step 2: Potential PI Research Interests

- When considering potential advisors, think about more than their research - do you share any common experiences? Is that important to you?

    - Common interests can be found on their websites and social media accounts. It is not weird to follow them on Twitter as this is a great way to get to know the research that their lab is doing.
- Don’t be afraid to contact potential advisors about their research and your research interests as soon as you’re interested in them, even if it’s a couple years in advance of when you’d be applying. You don’t have to mention that you’re considering graduate school if you’re a sophomore, but it helps to establish a relationship early.

## Step 3: Reaching out to Potential PIs

- Once you’ve come up with a list, send a professional e-mail (page 10) to ask if they can support students when you’re interested in applying (funding, time, etc.).
- Talk to former and current graduate students in their lab in a setting away from the advisor. Most are happy to talk on the phone or do a video call. If a potential advisor does not give you a list of students to talk to, this is very likely a RED FLAG. If a potential advisor does not suggest talking to the one person in the lab that looks like you this may also be a RED FLAG and you may want to reach out to this person to gauge their experiences as the “one of” in the lab.
    - Graduate school in itself is a stressful time and you will need to be in a supportive environment to complete your degree. Difficult PIs DO exist, and you need to decide if you can work with a potentially difficult PI or not. Knowing this before making a decision about where to go to grad school will help you decide.
- If an advisor you’re interested in e-mails back that you can apply, ask if they can do a video call for an hour. Use this time to get to know them and figure out if it’s worth both your and their time for you to apply (page 9, 11).
    - Video calls are now easily done via multiple platforms: Skype, FaceTime, Zoom, Google Hangouts, etc.

## Step 4: Visiting Potential PIs and Programs

- If you want to visit the school before you’ve received a decision, you will probably have to pay for this yourself, but make sure you coordinate your visit with the advisor so you can meet with as many people as possible.
    - It is best to plan this out ahead of time (a month or more).
- If you are accepted, the school or the advisor should pay for you to visit. If they do not have funds to support this, that says a lot about their ability to financially support graduate students (and it’s not good!). Keep this in mind when make your decision.

# Picking the right program

It is important to think about whether the program you are applying to is a good fit for you. Ask yourself the following questions:

1. Would you be comfortable living in this location for 4 to 10 years?
    a. Weather/climate
    b. Recreation
    c. Internet service
    d. Housing
    e. Political climate
    f. Safety for underrepresented groups
    g. Anything else that is part of your value or salient identity.
2. Would your lab be a comfortable environment for you?
    a. What does communication look like in the lab
    b. What is the social dynamics of the lab
    c. Personal/professional boundaries (what does this look like)
    d. What is expected of you as a student
    e. If you will be one of, what is the experience like for the other one of who looks or identifies as you do
3. What social actions is the institution taking/ taken towards creating an equitable environment.
    a. Ask this question
    b. Look it up to see what they openly advertise
    c. It's great to get multiple perspectives here

In order to get clarity on some of these aspects below are some questions you should ask while applying.

## Questions for Grad Students

### about the student

- What degree are you pursuing?
- How long have you been there and in how much time do you expect to complete the program?
- How did you come up with the project you are working on?
- What are your career goals?
- What is the social dynamics of the lab?
- As an “insert identity” what has been your experience in the lab department?
    - You might preface with how do you identify or can I ask some questions that are more about you as a person in graduate school.

## about the lab/PI

- What does a day in the lab look like for you?
- How much time are you expected to be at the lab? Do you often spend more time than expected?
- What is the PI/student mentoring relationship like? How often do you meet with your advisor?
- What is the lab culture like? Do you have frequent lab meetings?
- Has anyone left the lab before graduating?

## about the program/department/university

- What was the application process like? (application materials, visiting, interviews, etc)
- What is the structure of the program? How many classes do you have to take per semester?
- Are there professional development/social activities organized by the program/department?
- Are graduate students unionized?
- What are your thoughts on the university's/department's response to covid?
- What are your thoughts on the university's/department's response to the anti-Blackness and systemic racism?
- Pros and cons of the program/department/university.

## about funding

- How does your funding work? (grant from advisor, funding through program, TA/RA-ships, private grant, etc.)
- Are you required to TA?
- Is health insurance included?
- Do you have summer funding?
- Can you live comfortably with your stipend? Is your stipend enough to live on?

## about the location

- What do you do for fun around there?
- What is the cost of rent/housing? Do you like where you live?
- Is public transport reliable?

# Questions for Potential Advisors

## about the lab

- What are your expectations for students? (time in the lab, publications, etc)
- Do you train your students for jobs in academia or are you ok with helping students pursue other careers? What are previous students doing after graduating?
- How many students are you currently advising?
- How long does it typically take your students to finish their degree? Are they on track?
- How is the lab operating during covid/what was your response to covid?
- What is your style of advising? (hands-on/hands-off, standing meeting with students, lab meetings, etc)
- What is the lab culture like?
- Do students select their own projects? Do they work on a larger project?
- Are you looking to take more than one student for this application cycle?
- Would you mind if I talked to some of your current or past graduate students?
- Do you have a lab policy document and would you be willing to share it with me?
- How often do you meet with your graduate students?

## about funding

- How would funding work? How much funding do you provide your students for projects?
- How are older grad students funded? Do they have issues with funding at the end of the program?
- Are you aware of any funding/grants I can apply for “insert project”?

# Example Email to Contact Potential PI

Dear Dr. ______,

I am a ____ (sophomore, junior, etc.) studying ____ (your major) at ____ (university name). My research interests include ____, ____, and ____. I was really interested in the research on ____ that you presented at the ____ (conference name) in ___ (year). I am looking into potential ____ (Master's/doctoral) programs and would like to know if you have funding to take new students in the Fall of ___ (year you'd like to start). I have attached my curriculum vitae for your reference and look forward to hearing back from you soon.

Sincerely,
____ (your name)

Department of ___, (college/university name)

## Note on contacting potential PIs:

- Include your resume or CV in the initial email. Professors will usually ask for it anyways.
- Some professors have specific documents (resume/CV, transcripts, writing sample) or questions that they would like to see in an initial email. Be sure to check out their lab page to see if they specify any of these things!
- If a professor does not respond: don't panic! Wait a week or two and try them again.

# Video Calls with Potential PIs

So you have a video call scheduled with a potential PI, what should you do to prepare?:

## Things to consider/do before meeting with PI:

1. Do some research on the PI
    a. What are their current research projects? (this can be found on their websites)
    b. What are their past research projects?
    c. What excites you about these projects?
        i. Take notes
    d. What would you want to learn/add to these projects?
        i. Check PI's research to see if these questions have already been answered.
    e. What are the topics of some of their recent papers?
        i. In the last 3 years
        ii. Use Google Scholar, google by their name, set range of dates
    f. What projects are their students conducting? (this should also be found on their website).

## Questions to ask during your video call:

1. I see on your website that you have been focusing your research on _____, what is it about this topic that _______?
2. What is your research plan for the next 5 years?
3. What is your mentorship philosophy?
4. How do your students settle on their topics? Are they able to select their own project?
5. What type of positions have your students pursued/filled after graduating?

See more questions on page 7.

**Be prepared to answer these same questions.**

Let the conversation progress naturally, but keep track of the time. If you scheduled to meet for an hour, try to not go over as both yours and your potential PIs time is valuable.

# How will I fund my graduate degree?

Graduate degrees are expensive but the good news is YOU SHOULDN'T HAVE TO PAY FOR IT! But how do you find the funding to pay for your degree and your annual expenses (living expenses, bills, etc)? Below are a few places to start looking:

- From advisor - they may have a grant
    - If they have a grant that will end while you're still in graduate school, make sure the university will pay for the rest of your time, and get this in writing.
    - Universities can pay through TA-ships or RA-ships (see pg 8)

- From the school - most schools give you a stipend and tuition in exchange for teaching assistant work
    - Find out if you have to work all semesters (fall, spring, and summer) to get funding for the whole year
    - Please note that some programs DO NOT provide funding during the summer, so find out if you'll have to find alternate employment or if your advisor/institution can support you through a TA/RA during the summer months.

- From external funding - there are some fellowships available, ex. GRFP, Ford Foundation, and some of these can be applied to once you're already in grad school (see page 13).

- Figure out what funding actually supports!
    - You should not go to a graduate program in biology that does not pay your stipend and tuition.
    - Some programs may also pay for some of your fees or for health insurance.
    - Make sure that the stipend they offer you will allow you to meet your financial needs without taking loans given the cost of living.

- There are specific grants and fellowships you can apply to on the next page. Make sure you check them out!

## When do you start looking for funding?

- As soon as possible, many opportunities must be pursued before you start school.
- There are also summer fellowships which allow you to start school early in a cohort of like minded individuals (ask about these).
- Contact the graduate school and ask about opportunities. Specifically, the office of Graduate Diversity Initiatives or an equivalent to find out what opportunities exist for you as a minoritized or marginalized individual. This is a great place to start building your community.

# Funding Opportunities for Graduate Students

## Not Institution Based

1. National Science Foundation (NSF) - Graduate Research Fellowship Program (GRFP) (more on this in the next section)
2. Ford Foundation Fellowship Programs https://sites.nationalacademies.org/pga/fordfellowships/
3. National Institutes of Health (NIH) - PreMed Students https://researchtraining.nih.gov/career/graduate
4. Howard Hughes Medical Institute (HHMI) https://www.hhmi.org/science-education/programs/gilliam-fellowships-advanced-study#Eligibility

## Institution Based

1. Graduate Department
2. Fellowships
3. Teacher Assistantships (TA)
4. Research Assistantship (RA)

# NSF GRFP

## What is it?

The GRFP is a fellowship that is awarded to the applicant accepted into a STEM or science education track graduate program at an accredited institute in the United States and its territories. The covers the fellow's tuition, and annual stipend (aka your annual salary) of $34,000/year for 3 years. Depending on your institution, fellows may receive additional perks. For example, at UF, GRF Fellows receive an additional $2,000 from UF for research or research-related travel expenses, tuition is fully covered, health care is covered, as well as student fees. These perks are exclusive to UF and vary between institutions. When looking to apply to schools, ask GRF fellows at those institutions what the institution provided them as perks for being awarded the Fellowship. Federal funding for the GRFP is generated through the tax dollars we pay each year. Meaning that fellows receive their funding through tax payers.

## Who can apply?

Fourth-year undergraduates can apply, during the fall of their final year, as can 1st and 2nd year graduate students (Masters & PhD). Please note that if you apply as an undergraduate and do not receive the Fellowship you CAN apply a second time. If you apply as a 1st or 2nd year graduate student YOU CAN ONLY APPLY ONCE. It is important in either case to write a robust and competitive application. Please note that if you have completed a Masters degree, there is a wait period between the completion of your MS and applying to the GRFP as a PhD student. Be sure you have a plan of what your academic goals are (do you need a Masters? Or can you go straight into a PhD) when looking to apply to the GRFP. Another thing to keep in mind, fellows can differ the Fellowship for up to 2 years from the date of being awarded.

## How do I apply?

Application for the next school year opens, traditionally, in the summer and closes as early as Mid-October, depending on the department/major you're submitting to (Life Sciences vs Engineering). To look at the solicitation, go to https://www.research.gov/grfp/Login.do and select the "Program Solicitation" link on the left hand side. This will give you the option to open a PDF or HTML link to solicitation with all of the important information you need to know about applying to the GRFP (i.e. due dates, format, etc.). The format and questions for what to include in the Research and Personal Statements change each year so make sure you read very carefully the requirements when you are applying.

## How is the application reviewed?

Each GRFP application goes through peer-review by a review panel that are experts in the field for which you're applying to (ex: applying to engineering? Your application will go to 3 engineers who have knowledge of the field). The applications are reviewed by the panel and you will receive the reviews by the panel along with the final decision (funded or not). If you apply the final year of your undergrad and are not funded, those reviews are incredibly important for when you reapply once you're a graduate student.

## How can I improve my chances?

a. Pay very close attention to that year's solicitation and it's requirements. Make sure you include ALL of the components of the application, or your application will not be reviewed.
b. Google "NSF's 10 Big Ideas" and see how your research topic fits in to NSF's 10-year vision. Make sure you identify the Big Ideas for which your research satisfies.
c. In the past few years, there has been a big push at NSF to focus on Broader Impacts (BI; how your science benefits the greater community, not just the science community). When designing your research statement, incorporate your BI plan from the very beginning. Why is your research important/relevant to the non-science community? Since funding is generated from tax-payers, why should they care and continue paying you to do your science? Coming up with a strong research and BI plan will make your application more competitive.
d. EDIT EDIT EDIT! We cannot stress this enough, MAKE SURE MANY EYES SEE YOUR PROPOSAL! This is a highly competitive and prestigious award. You want to take as much time as possible to plan, develop, and write your proposal. Make sure you start early (as soon as the application opens!) and that you give yourself ample time (a month is good) to edit your proposal. People who should edit your proposal: academic advisors (either professors you trust as an undergrad; majors advisors), fellow grad students, PAST/CURRENT GRFP RECIPIENTS, etc. Do not be shy to reach out to other GRFP recipients, we are more than happy to help edit your proposal as we remember how hard it is! You can find a list (and filter by institutions) of awardees at https://www.research.gov/grfp/AwardeeList.do?method=loadAwardeeList Make sure you reach out early and let them know you are planning on applying and looking for advice/editors.
e. You will need 3 letters of recommendation for your application. It is important that these letters come from professors in the field that you are applying to. This can be your majors advisor/professor, your PI, committee members, etc. Make sure you notify them early of your intentions of applying for the GRFP as they will be good editors and will need to be aware of your research project when writing your letter of recommendation.

# What are the expectations of the Fellows?

Once offered a fellowship, awardees are expected to select an institution to complete their studies. Please note that even though you identified a research project in your proposal, if awarded, you do not need to complete that specific project. The GRFP is to see if you can design a viable research project, so if you choose to change your project, you do not lose your funding.

# Additional resources

- UC Davis Evolution & Ecology Graduate School Preview: https://eegradpreview.weebly.com/program.html
- NSF Research Experiences for Undergraduates: https://www.nsf.gov/crssprgm/reu/
- Pathways to Science Resources: https://www.pathwaystoscience.org/Discipline.aspx
- The Society of Vertebrate Paleontology has just started a new grant program: https://vertpaleo.org/wp-content/uploads/2021/02/17-SVP-Futures-Award-020821.pdf. Here's the application: https://www.surveymonkey.com/r/GY7XGZB

# Authors contact information

Good luck on your journey! Please feel free to email us if you have additional questions, or follow us on social media. Also please acknowledge us as you share this information with others.

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# Don’t forget to fill out the iDigTRIO survey!

Link: https://ufl.qualtrics.com/jfe/form/SV_1ztOqd8Zlpy8chU
QR code: