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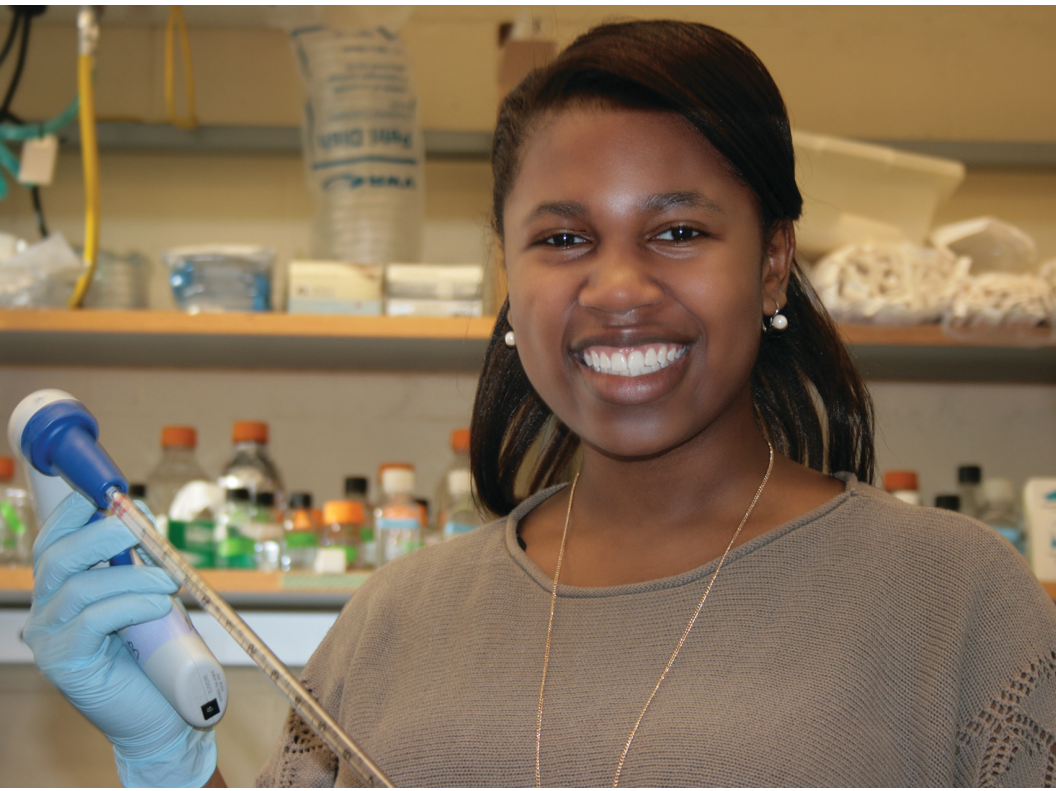
Student Handbook for Undergraduates in the Life Sciences



STUDENT HANDBOOK FOR UNDERGRADUATE SCIENCE RESEARCH

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SCIENCES EDUCATION OFFICE
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Why Do Research as an Undergraduate?

What does it mean to be involved in a hands-on scientific research project? All scientific research involves working on a question to which the answer is unknown - otherwise there would be no point in pursuing the work! Indeed, one of the most exciting aspects of being involved in research is that you will have the chance to learn something, however small, that no one has ever known before.

Harvard undergraduates have the opportunity to become involved in many different types of scientific research. Many undergraduates do bench work in Harvard faculty laboratories (including laboratories at Harvard affiliated hospitals), while others work on projects in the field or do clinical research. Because the majority of students work in labs and for the sake of simplicity, in this handbook we refer to research groups as “labs.” However, the term “**labs**” should be interpreted broadly because some students may work with faculty who are primarily engaged in fieldwork or more clinically related types of hands-on, non-laboratory-based research.

Typically, the faculty member who directs the group's research goals and writes the grants that fund the work is referred to as the "**Principal Investigator**" (PI). It is common for students to refer to their PI as their faculty sponsor or faculty mentor. However, faculty normally do not directly supervise students in the lab or the field. Rather, it is common for a graduate student or postdoctoral fellow working in the PI’s research group to act as the student’s mentor and supervise their day-to-day work.

What is the intrinsic value of research to an undergraduate experience?

Exposure to basic research has many benefits for students; even those who do not plan to pursue it as a career. Hands-on experimental science is the practice of science and as such it is an integral part of a science education. Active engagement with the concepts and principles of science not only encourages students to grapple with new ideas but also teaches them how to solve scientific questions, formulate hypotheses, design experiments, analyze data and make informed decisions about the next steps in the research process. Some students find their undergraduate research so enjoyable and rewarding that they reconsider their future plans and begin exploring careers in research - it happens!

Because research is such an integral part of a science education, direct participation in inquiry-based research for one semester is a degree requirement for most of the Life Sciences concentrations. Although a senior thesis based on independent research is not a standard degree requirement, many students choose to write one. In addition, some concentrations do require a thesis for honors eligibility.

Independent research is an essential component of an undergraduate education, and Harvard is committed to ensuring that every Harvard undergraduate who concentrates in one of the Life Sciences will have the opportunity to engage in original, independent research.

Are there ways to "try out" research before committing to a lab?

Previous lab experience is not required for doing research at Harvard. Most faculty expect to train students as they come into the lab, and many undergraduates choose to begin their research careers by joining a faculty member's lab or research group.

However, some students who have not had previous laboratory experience are more comfortable gaining some exposure to basic laboratory techniques by enrolling in a project-based research course before committing to a faculty member's group. Harvard offers several such laboratory courses designed to introduce students to experimental research, including Life Sciences 100R, Organismic and Evolutionary Biology 100 and Chemistry 100R. These courses are structured to teach students standard laboratory procedures in the context of projects that are linked to faculty research. Thus, students are exposed to basic research skills and techniques while experiencing lab culture, which may ease their transition into faculty research groups. However, these courses are not prerequisites for joining a lab; if you are certain that you want to do research, you may decide to start right out in a lab.

When is the best time to get started in a lab?

The answer to this question is highly dependent on individual circumstances. We strongly recommend that freshmen wait at least until midway through their first semester at Harvard before beginning to think about finding a lab. Even students who have had previous laboratory experience are likely to find that adjusting to life at Harvard requires time and effort. Getting involved in research at Harvard is a significant undertaking, and it is best not to add such a major commitment too soon. Freshmen who are eager to get started in research during the spring semester or over the summer may want to begin the process of finding a lab in the beginning of the November, by talking to the Undergraduate Science Research Advisor and attending Life Sciences Undergraduate Research Fair. Some students may feel pressured to begin working in a lab because their peers have already found research positions, however we recommend that you take your time and figure out what area of research you would like to pursue before getting started. There will be plenty of time to work in a lab during your undergraduate time at Harvard.

Many students prefer to wait until sophomore year to get started in lab, and there are some benefits to this approach.

1. You will have settled into life at Harvard and have a better sense of how to manage your academic and extracurricular time commitments
2. You will have had at least one or two additional semesters of course work, and therefore have a better sense of the type of scientific questions that most interest you.
3. You will have a better understanding of the science underlying the lab's research after you have taken some foundational science courses.

4. In many ways choosing a lab and a concentration go hand-in-hand, and you may find that your research interests will inform your concentration choice.

Some students postpone starting research until their junior year, and that is fine. Ordinarily, students who start research in the fall semester of their junior year and who plan to spend the summer before senior year working on their project will have made sufficient progress in their research to write a thesis With careful planning and close mentoring, even students who begin in the spring of their junior year (and spend the summer before senior year working on the project) usually are able to write a thesis.

It is rare for students who start a research project in the fall of their senior year to have made sufficient progress to write a thesis. In addition, it may be difficult (although not impossible) to find a PI willing to accept a student who will be in the lab for only two semesters of research. Because it takes time to properly train a student in the lab, many PIs prefer to expend their resources on students who will be available to work in the lab for at least two or three semesters and one full summer. Therefore, if you decide to wait until senior year, you may find that your lab options are more limited.

Note that the research and thesis requirements vary somewhat among concentrations; thus, it is a good idea to contact the relevant Life Science Concentration Advisor.

How do I find a research position?

How do I begin?

Harvard has over 1000 laboratories at the FAS, professional schools and Harvard-affiliated hospitals, many of which welcome undergraduates. However, finding the one that is right for you can at first seem quite daunting. It can be tempting to choose a lab, because a friend or Peer Advising Fellow (PAF) has mentioned that they had a good experience there or because the location is convenient; but it is important to consider the amount of time that you will be spending in the lab over the next few years and understand that the experience will be more rewarding if you love the work that you are doing. Working in a lab should be a positive experience (although there will always be a few tough days) and for that reason, it makes sense to spend some time thinking about the kinds of research questions that truly attract you.
Defining a broad area of interest is the first step to narrowing down your lab search:

- Are you excited or curious about fundamental questions such as the mechanisms of chemical reactions or cellular processes such as metabolism and differentiation?
- Or perhaps you are intrigued by more clinically related topics, such as understanding what underlies the progression of neurodegenerative disease or the proliferation of cancer cells.
- Maybe you are drawn to study the effects of climate change on amphibian populations in the tropics.
- Alternatively, if you enjoyed doing a special project or research during high school, you may want to consider using that experience as a starting point to guide your search.
- If you are truly unsure about what kinds of research questions you want to pursue, it might be helpful for you to think about the courses that you've enjoyed - were there any lectures or readings that you found particularly stimulating?
- Meeting with the faculty member whose course inspired you might lead to discussions that will help you find faculty at Harvard who are doing research related to that topic.

After thinking about the questions above, schedule an appointment with the Life Sciences Undergraduate Research Advisor to narrow your research interest. There is no rush to begin research, so take your time and use your search as an opportunity to explore new options and ideas. Whether you select a lab as a freshman or as an upperclassman, your passion for the work and how good a fit the lab seems to be when you meet with them should be important criteria in making your choice - don’t choose a lab simply because it seems to be an easy option.

While talking to other undergraduates may help you get information about specific labs, keep in mind that their experience is likely limited to just one or two labs and that one student's experience may not be applicable to others. A student may have had a terrific experience in a particular lab due to a great mentor or project. Conversely, if a student did not have a stellar experience in a lab, the fault may not have been entirely with the lab. It is therefore crucial to obtain expert advise from the Life Sciences Undergraduate Research Advisor. You can find more information about finding the lab on our FAQ webpage.

Can I choose a lab if I don't yet know my concentration?

Yes! Sometimes the process of searching for a lab helps students identify their academic interests, which in turn may inform their concentration choice. Because most concentrations are quite flexible about the range of research topics that are acceptable for credit, if you get started in a lab and are happy there, you may be able to continue working in that lab even if your project is only peripherally related to your final concentration. Keep in mind, however, that research and thesis requirements vary among concentrations. Therefore, to ensure that your project is acceptable for research credit in your department, it is always a good idea to discuss your research plans with the relevant Concentration Advisor.

Remember that you can always wait to find a lab until after you have chosen a concentration. You will have plenty of time for research as an undergraduate at Harvard. There is really no pressing need to get started in your freshman year, and for some, it may be better to wait until you have taken more courses and been exposed to more topics.

How do I contact faculty about a research position?

The next step is to prioritize your list of labs (5-7 labs is usually sufficient) and prepare your science resume (per template). Next, make an appointment with the Life Sciences Undergraduate Research Advisor, who will review your science resume, discuss your research interest and provide guidance on how to write the first email to your top choice labs. Your first email and resume quality will be all the professor will have to make that first impression and decide whether to proceed with your candidacy or not. Thus, it is critical that both resume and email be formatted not only in professional, organized and succinct manner, but also would be specifically targeted to each lab. Do not send a generic email; it very likely won't be read, and if it is, it probably will not be viewed favorably. Before you begin to write, make sure that you have done your homework – reread the group's webpage, a recent manuscript published by the group and understand in general terms what research is conducted. It is not necessary at this point for you to understand all the details of the mechanisms or pathways that the lab studies; instead try to get a sense of the

kinds of questions they are asking and the systems they use to answer them so you can demonstrate a basic knowledge of the lab's work. This is key - you must be able to explain in the letter what it is about the research questions the lab is asking that makes you want to be a part of their group. If you have a specific personal reason for your interest in their research, it is fine to mention it briefly; however, it is important to have a genuine scientific or intellectual interest in the work conducted. You do not have to describe their research in great detail (this is not a term paper), but you do have to convey some general background knowledge of their work and convince them that you are genuinely excited about it. Life Sciences Undergraduate Research Advisor will provide a tem plate cover email and more guidance on your specific situation.
Previous lab experience is not necessary for a lab position, but enthusiasm and a sincere interest in the lab's work are crucial, which come across in the first email you write. Many faculty members, but not all, will answer student emails in a timely manner even if they do not have a position available.

How should I prepare for an interview with a lab?

A PI who has an opening for an undergraduate and is interested in your application letter will likely contact you and invite you to meet with them. You should prepare for this meeting by reviewing the lab website and the papers you have already read. Try to find a review article that will provide you with some background in the field so you can get a sense of where the lab's research fits into the larger picture. You may want to use this meeting to mention which of the several ongoing projects in the lab you find most interesting and why. It may not be possible for you to work on a specific project if there is no mentor available, but it is useful to let the PI know that you are proactive and have been thinking about it. The PI may ask about your future plans and if you don't know, it is perfectly acceptable to say that you are not sure. In general, you do not need to propose a research project on your own; at first, you will probably contribute to an ongoing project in the lab. Later, as your training in the lab progresses, you will probably be involved in developing your own independent project. For more information about the characteristics of a good undergraduate project, see the **section on Getting Started in the Lab**.

Remember that the meeting with the PI is a conversation that will give you an opportunity to find out more about the lab and their experience with undergraduates. Among the questions that you might consider asking during the interview are:

- What kinds of research projects have students done in the past?
- Did you do research as an undergraduate?
- Do you think it is important for students to have a research experience?
- How many hours per week do you expect an undergraduate to spend in the lab? How often would we interact in the lab or meet to talk about my progress?

The Life Sciences Undergraduate Research Advisor will provide additional coaching for interview preparation.

Some PIs expect students to spend more time in the lab than others. Prior to accepting a position in a lab, it is prudent to ask the PI about their expectations for a student's time commitment. For freshmen and sophomores who are still taking lab-intensive courses, we recommend that you plan to spend no more than 6 to 10 hours per week in the lab. However, because course workloads vary during the semester, there may be weeks when you feel that you can comfortably spend more time in the lab. But there may also be weeks, especially during exams, when you might not be able to get to the lab at all. What is important is that you have a clear understanding of the PI's expectations and maintain good communication about your weekly schedule with the lab. Do not commit to spending more hours per week in the lab than you can reasonably manage.

Casual business attire is appropriate for your meeting with the PI. Lab dress tends to be informal, but jeans and a t-shirt may not give a very good impression for an interview. A jacket and tie is too formal and might seem out of place in this situation.

If I receive offers from more than one lab, how do I decide among them? How do I decline offers from other labs?

Ideally, you will receive offers from one or more labs in response to your emails. While it is nice to have the opportunity to meet with two or three PIs before making an informed decision about which lab is the best fit for you, one interview may be enough if you have done your homework and know that you are interested in that lab's work. Remember that the meeting is a two-way conversation – they want to meet you to see how you will fit with their lab and you will have a chance to determine if the lab is the right place for you.

- Were your comfortable during the interview?
- Did the PI take the time to adequately explain the lab's research?
- Did you get excited about working with the group?
- Did you have a chance to meet your lab mentor?
- Are their expectations for a time commitment reasonable?
- And importantly, are you still interested in the questions that the lab's work addresses?

Because the vast majority of labs at Harvard provide good mentoring and research experiences for undergraduates, your choice of a lab often will come down to deciding what projects or questions most interest you. However, sometimes the lab whose research most interests you may not be the best fit in other ways. Perhaps the time commitment is too much while you are still taking lab intensive courses, you suspect there might not be much interaction with the lab PI, or you just weren't comfortable with the lab atmosphere. These are valid issues to consider in addition to the science. Choosing a topic for your college research does not imply a life-long commitment; indeed, it is unlikely that you will continue to work on your undergraduate research project in graduate school. Ultimately, in addition to your

excitement about the lab's work, you might also want to consider choosing a lab in which you will have a positive experience, receive good technical training, learn how to give a clear lab presentation, write cogently about your work, and also have fun! One way to find out about other undergraduates' experiences in a particular lab is to contact students who are currently working there and ask whether they would recommend joining that lab.

But remember, one student's experience may not reflect the norm for that lab (see How do I begin looking for a lab?). It is worth taking your time to find a good lab fit. Many students have told us that the most significant factor in their enjoyment of their lab experience came from their engagement with others in the lab and their relationship with their lab mentors and PI.

Once you have made the decision to accept a lab's offer, you should inform the PI as soon as possible because other students may be waiting to hear if there is space in that lab. For the same reason, be considerate and notify the labs whose offers you are declining in a timely manner so they can accept other students. The simplest way to decline a lab position is to send a brief email thanking the PI for their time and telling them that you have decided to accept another offer.
Your email doesn't have to be more than a few sentences long, but you should not delay in notifying them of your decision.

What to expect when you start in a laboratory?

Meeting with your lab mentor

You will likely be assigned a graduate student or postdoc mentor, who will direct your daily work, be responsible for teaching you lab procedures and techniques and help you develop an independent project. During the first meeting with your mentor, you may discuss background reading for the project, basic lab rules, and your schedule for coming to the lab.

- **Background reading for the project:** You will have already read some papers about the lab's research for your application letter, however those papers may not be directly relevant to your assigned project. Your mentor can suggest more specific readings for you. If you do not understand some of the material in the papers, ask your mentor to set aside time for discussion. Part of the mentor's role is to ensure that you have a basic understanding of the science behind the questions that you will address in your experiments.

- **Setting up a work schedule:** This is very important for both you and your mentor. It is much easier for your mentor to design a teaching plan if they know when and how long you will be in the lab each week. Remember to be considerate of your mentor's time. It can be very frustrating for them if you do not show up at the appointed time so you should always make an effort to communicate a change of schedule in advance. Having a regular schedule for going to the lab may also help you to keep track of the time you are spending there.

- **Attending Lab Meetings:** Lab group meetings are great way to get to know your lab mates and learn about other ongoing projects. Obviously, your class schedule will determine whether you are available to attend group meetings regularly but you should try to participate whenever possible. At some point, you will be expected to present your own work to the group, and this is easier to do if you already have attended several meetings and are comfortable talking to the other lab members and asking questions. Some lab mentors find it useful to set aside time with their students after the lab meetings to go over the material that was presented. You should take advantage of this opportunity to ask questions about the other projects in the lab.

Laboratory rules and regulations

Lab Safety Training: Harvard requires all new employees or trainees working in Harvard labs to pass a Laboratory Safety Training Course. On-line training is available through the EH&S Training Management System. Your lab manager or administrator will have the information about the course. In addition, many labs may mandate further safety training for specific techniques and procedures that they use. These trainings are particularly important for students who are just getting started in the lab and may not be familiar with the procedures for handling and disposing of hazardous materials or working with animals.

Research Integrity Training: Scientific research is governed at both the institutional and federal level. Harvard undergraduates are expected to become familiar with the ethical standards of their discipline and conduct their research activities with the highest level of integrity and commitment to excellence. As an undergraduate, you are encouraged to ask questions about proper practices and procedures, to be organized and accurate in all of your research activities, and to follow the directions of your faculty mentors and other research staff closely. In addition to the guidance that you receive from your faculty host, the Harvard Undergraduate Research and Fellowship Office offers online RCR training which will help determine whether student need additional Animal Research Training or Human Subject Research Training. If you work at the Harvard-affiliated hospital or Harvard-affiliated institute, they might have specific trainings. Thus, contact your PI for lab-specific requirements.

Lab Rules, Responsibilities and Jobs: As mentioned above, many labs have rules that are more specific than those covered in the safety trainings. It is up to you (with help from your mentor) to learn about these lab-specific regulations. For example, some labs have rules about reserving heavily used instruments ahead of time. This means that if you sign up to use that equipment and your plans subsequently change, you must let someone in the lab know so it can be made available to others.

In many labs, the members share duties for preparing common stock reagents and maintaining shared lab equipment. It is your responsibility to know which lab duties and general tasks have been assigned to you and to perform them conscientiously. This may seem trivial, but it is attention to such details that helps to keep a lab running smoothly. Your mentor should review all of this before you begin doing experiments in the lab.

It is essential for you to allow adequate time to clean up your space in the lab before leaving for the day. *There is no faster way to annoy others in the lab than by ignoring lab rules or leaving a mess behind when you have finished an experiment.*

Starting on your own research project

You will probably begin your training by working in parallel with your mentor on their project until you have mastered basic techniques and become more familiar with the science behind the experiments. But within a relatively short time, you may have acquired sufficient skills to be ready to move on to a more independent project. The time it takes for a student to gain enough technical skills to undertake a more independent role in a project varies greatly and is influenced by factors such as how technically difficult the experiments are, the amount of time the student can spend in the lab, as well as their level of engagement and previous experience. Your independent project may be one that the PI has already identified for you or it may evolve out of your interests as you learn more about the lab's research. You may participate in the design of the project, but it is more likely that this will be done primarily by the lab PI and your mentor. Designing a good undergraduate project involves not only consideration of the student's time and technical expertise, but also how the results will contribute to the overall research goals of the lab.

Most mentors help students to become more independent in the lab, but some students are fearful about that transition. Just keep in mind that undertaking an "independent" project doesn't necessarily imply that you will be working entirely on your own. Your mentor will still be there to help you with experimental design, data analysis and planning the next experiments, but you will have more input into the process and gradually be able to perform these tasks on your own.

Conversely, if you feel that you are ready to undertake your own project but find that you are merely functioning as a lab assistant, talk to your mentor (or your PI) about what steps might be needed for you to become more independent in the lab. PIs have different philosophies regarding when an undergraduate might be ready to start working more independently, so you may need to be patient. It could be that the lab just hasn't had much experience mentoring students so their expectations and projects are not properly gauged for undergraduate researchers. However, it is also possible that your mentor and PI may have valid reasons for deciding that you are not ready to move into a more independent research role. Perhaps they think that you need to get more technical training, change your work habits, pay more attention to detail, keep better records of your experiments or be more diligent in the lab. You should take their suggestions seriously. If after talking to your mentor and PI it becomes clear that they are reluctant to allow you to begin an independent project, you may want to talk to someone outside the lab such as Undergraduate Science Research Advisor or your Concentration Advisor. Be patient, keep the communication lines open, update your advisors about the situation and listen to their suggestions. At some point you and your advisors may decide that your conversations with the lab are not progressing satisfactorily and it is time to consider seeking a position in another lab. However, that step should be taken only after you have made an effort to find other solutions.

Most Harvard undergraduate research fellowship programs assume that students will be working either on their own project or on an independent aspect of their mentor's project soon after they start in the lab. However, the degree of independence varies from lab to lab depending on the student’s level of technical expertise and the PI’s approach to undergraduate research.

What are a student's responsibilities to the lab?

Lab citizenship and effort

Accepting an undergraduate into a research group and providing training for them is a very resource-intensive proposition for a lab, both in terms of the time commitment required from the lab mentors as well as the cost of laboratory supplies and reagents. It is incumbent upon students to recognize and respect this investment.

- One way for you to acknowledge the lab's investment is to show that you appreciate the time that your mentors set aside from their own experiments to teach you. For example, try to be meticulous about letting your mentor know well in advance when you are unable to come to the lab as scheduled.

- On the other hand, showing up in the lab at a time that is not on your regular schedule and expecting that your mentor will be available to work with you is unrealistic because they may be in the middle of an experiment that cannot be interrupted for several hours.

- In addition to adhering to your lab schedule, show you respect the time that your mentor is devoting to you by putting forth a sincere effort when you are in the lab. This includes turning off your phone, ignoring text messages, avoiding surfing the web and chatting with your friends in the lab etc. You will derive more benefit from a good relationship with your lab both in terms of your achievements in research and future interactions with the PI if you demonstrate a sincere commitment to them. We have heard reports from some PIs who were unhappy with their undergraduates because they did not appear to appreciate the time that their mentors spent working with them.

- There will be "crunch" times, maybe even whole weeks, when you will be unable to work in the lab as many hours as you normally would because of midterms, finals, paper deadlines, illness or school vacations. This is fine and not unusual for students, but remember to let your mentor know in advance when you anticipate absences. Disappearing from the lab for days without communicating with your mentor is not acceptable. Your lab mentor and PI are much more likely to be understanding about schedule changes if you keep the lines of communication open but they may be less charitable if you simply disappear for days or weeks at a time. From our conversations with students, we have learned that maintaining good communication and a strong relationship with the lab mentor and/or PI correlates well with an undergraduate's satisfaction and success in the laboratory.

- Perhaps the **best way** for you to demonstrate your appreciation of the lab's commitment is to approach your project with genuine interest and intellectual curiosity. Regardless of how limited your time in the lab may be, especially for freshmen and sophomores, it is crucial to convey a sincere sense of engagement

with your project and the lab's research goals. You want to avoid giving the impression that you are there merely to fulfill a degree requirement or as prerequisite for a post-graduate program.

Time commitment

Term time: As we mentioned in the lab interview section above, many freshman and sophomore science courses include time consuming lab and section components. For this reason, it can be stressful for students to manage the time needed to fulfill these course requirements while simultaneously working in an outside lab. The general rule of thumb for students who are taking lab intensive courses is to plan on spending six to ten hours per week in their research labs. It is fairly common for students to commit to more hours per week than they can reasonably manage because they think that it will increase their chances of securing a lab position. However, it is probably better to slightly underestimate the time that you are able to spend in the lab and work longer hours when possible rather than overcommit and not be able to fulfill your obligation. Falling behind in your courses because you are spending too many hours in the lab is not a good trade-off. If you receive an offer from one of your top choice labs but the PI expresses unwillingness to compromise on a reasonable time commitment, it may be best to seek another position or to talk to one of the Life Sciences Advisors about how to respond to the situation.

Most labs will be sensitive to the time issue especially if you explain the situation with your course schedule and have a clear plan for being in the lab during the January break and/or over the summer. You also may want to demonstrate a stronger commitment to the lab in the future by indicating that you plan to take an independent research course for credit in junior year and/or write a senior thesis Students whose course loads are lighter may consider working more than 10 hours per week in the lab. Juniors and seniors, who are doing research for credit through either an independent research or thesis course, normally spend a minimum of 15-20 hours per week in the lab (required hours may vary based on concentration, contact your *Life Science Concentration Advisor*).

Your course workload likely will vary during the semester and most labs will be sensitive to the "crunch" times for undergraduates. If you are overwhelmed with papers and midterms one week, talk to your mentor about making up the time later in the month. This is much better than ruining an experiment for which you have spent weeks preparing because you are unable to focus on work in the lab. Students should avoid making up lost time in the lab by working late at night or on weekends when other lab members are not present. Accidents can and do happen; therefore it is NEVER a good idea to work in the lab alone and this is especially true for students who have little or no lab experience. It is best to create a schedule that maximizes overlap time with your mentor; but if you need to work after normal lab hours, it is your responsibility to ensure that someone from the lab will be there with you.

We strongly advise students to consider seriously the time commitment that they can make to a lab and not agree to undertake more hours per week than they can reasonably manage during the term.

Summer: Working in lab full time over the summer provides students with a great opportunity to consistently devote time to and become fully immersed in their research projects. For this reason, the Harvard summer undergraduate research programs require that students work in the lab a minimum of 40 hours a week for 10 weeks. Students who have outside jobs or other obligations during the summer and who are therefore unable to commit to working full time in the lab are not eligible for these fellowships. The exception to this standard is the Harvard College Research Program (HCRP), which may fund students for part-time lab work over the summer. Students must indicate on their HCRP applications the number of hours per week and the number of weeks they plan to work in the lab.

Funding for undergraduate research

Term time funding

Students may work in the lab during the term in one of three ways - volunteering, receiving a stipend or working for academic credit. Many students start by volunteering in a lab during term time; however, others may need a stipend so that they can pursue research rather than working at a campus job. For students who are unable to volunteer their time, there are a few ways to obtain funding for your research. Funding may be available through the faculty sponsor's grants or from one of several sources of funding provided through the Student Employment Office. Students who want to receive academic credit for their research (usually juniors doing an independent research course or seniors working on their theses) must obtain permission from their your *Life Science Concentration Advisor*. Students may not simultaneously receive funding and course credit for their lab work.

- Harvard College Research Program (HCRP) provides up to $1000 per term. Application deadlines for term time awards are normally within 2 weeks after the start of the term.

- Federal Work Study Program (FWSP) may be used to provide a student stipend for work done during the term or over the summer. Your financial aid award will indicate whether you are eligible for FWSP. Check my.harvard.edu to verify your status. For FWSP the lab provides 30% of the student's stipend and the US government provides the other 70%, which helps to offset the cost of a student stipend for a lab. Students who are not US citizens are not eligible for FWSP. Eligible students should apply through the Student Employment Office:
  Manager of the Federal Work Study Program
  Steven Cilento Jr.
  p: (617) 495-2587
  steven_cilento@fas.harvard.edu

- The Faculty Aide Program (FAP), administered through the Student Employment Office, encourages faculty to hire research assistants. Students who are working on "independent" projects are not usually eligible. Students may earn up to $3000/year through FAP (half of the stipend is funded by the FAP and the other half paid by the faculty member). Faculty should apply directly to the SEO for this funding using online application.

Summer fellowships

Harvard offers several summer research fellowships for students, who want to work in Harvard labs. Information can be found on the Science Education Office webpage. Many summer fellowship representatives will be present at the HUROS to provide more information about specific programs. Applications for summer research fellowships are due anywhere from mid-October to late March, depending on the program. The deadlines for some of the more competitive fellowships, such as PRISE and Herchel Smith, are normally in mid-February, whereas HCRP applications are usually due in late March.

The three primary Harvard summer undergraduate research fellowships are:

PRISE (Program for Research in Science and Engineering): The purpose of PRISE is to create a small, diverse community within the larger sphere of undergraduate science at Harvard. This 10-week program provides students with housing in one of the undergraduate houses, meals during the week, a modest stipend if they do not receive any other fellowships, great social activities, and faculty lectures in the evenings. PRISE fellows are expected to fully participate in the community and attend the evening programs. PRISE is limited to around 125 to 150 students and is quite competitive. The application requires two essays from the applicant: a research proposal and an essay on the student's expectations for and contributions to living in a science community. PRISE fellows are expected to find their own research positions; however, students may apply to the program before having secured a lab position. Obviously, students who have not found a lab placement by the application deadline will not be in a position to write a specific project proposal; however, they are expected to submit an essay that broadly outlines their research interests. The selection committee allows some leeway in these instances as long as the essay has some scientific merit and makes a connection between the applicant's research interests and academic goals. The selection committee expects a more detailed research proposal from students who already have found research positions. Your lab mentor can provide you with background material and work with you on your project proposal. Be sure to phrase the proposal in your own words and not use wording taken directly from lab publications or their web site. You also are required to submit a second essay that describes how you plan to engage in and contribute to the PRISE community. You will need two letters of recommendation for PRISE. In addition, if you have secured a lab position before the application deadline, your lab PI must submit a brief confirmation letter affirming that you will be working in their lab for the summer.
The deadline for PRISE applications is mid-February. Students who are accepted into PRISE may also accept fellowship stipends from other programs. PRISE is administered through the Harvard Undergraduate Research and Fellowship Office.

Harvard College Research Program (HCRP): This is the largest source of undergraduate research support for students who are working with Harvard faculty members. Typically, between 40-50% of applicants receive some funding. Students must have secured a lab position before applying. The HCRP application requires a

fairly detailed research proposal (see application instructions and make sure to include section headers and each item required for the proposal as well as proposal tips) and a letter of support from the lab PI. The deadline for HCRP applications for summer fellowships is late March. HCRP also provides term time funding for student research. HCRP is administered through the Harvard Undergraduate Research and Fellowship Office.

Herchel Smith: This fellowship is quite competitive and applicants are expected to submit a detailed research proposal (see application guidelines) that demonstrates a high level of understanding of the science and experimental design for the project. Herchel Smith supports highly motivated, talented and promising undergraduate scientists who have designed outstanding projects for full-time summer research. Students may not accept a Herchel Smith Fellowship award in conjunction with any other fellowships with the exception of PRISE. Herchel Smith is administered by the Harvard Undergraduate Research and Fellowship Office. Students doing research abroad or in labs outside of Harvard may also apply for a Herchel Smith Fellowship to cover their travel and living expenses. The deadline for Herchel Smith applications is mid-February.

Ideally you should have confirmed a lab position far enough ahead (end of Fall term-January) of the summer fellowship deadlines to allow time to meet with your PI and lab mentor to discuss a project. This will help enormously as you prepare to write the research proposal for your fellowship applications (note, that research proposal requires several drafts before final document can be submitted). The more time you have to prepare drafts of your proposal and get feedback from your mentor, the stronger your application is likely to be. You may find it helpful to set up a timeline for submitting drafts to your mentor to ensure that they will have enough time to read and return them to you with comments before the deadline. **DO NOT LEAVE THIS UNTIL THE LAST MINUTE**. Your mentor may not have time to review your proposal if you send it to them the day before it is due.

The summer fellowships are quite competitive; therefore, submitting a well thought out, tailored and cogent research proposal is key to being selected. It is important that you write the proposal in your own words; copying sentences or paragraphs from the lab's website, grant proposal or papers is **not appropriate** under the Harvard Honor's Code and such students will face Academic Dishonesty charges.

The Harvard Undergraduate Research and Fellowship Office holds several workshops throughout the course of the year to help students to prepare for the summer fellowship application process. A general session on how to identify research opportunities and apply for research funding is offered to all freshmen shortly after Thanksgiving. In addition, the Office of Career Services hosts a summer opportunities fair in early December and this is a good chance to learn from funding sources about what is expected in the application and how best to prepare a high-quality proposal.
For most of the summer research fellowships you will also need at least two letters of recommendation (see the details for specific fellowships below or on-line). Faculty,

advisors, proctors and house tutors receive many requests for summer fellowship recommendation letters – often at the last minute - and it can be quite difficult for them to write a strong letter with little lead-time. For this reason, it is best to arrange a meeting with your recommenders and ask for a letter in person several weeks before the application deadline. You should provide them with some background information about the fellowship(s), explain why you are applying, and give them an updated resume. The fellowship review committees rely heavily on these letters so it is worthwhile to work with your recommenders to obtain a strong endorsement.
Occasionally, students may not receive summer research funding from any of the fellowship programs either because their application was too late or not very strong. If you find yourself in this situation, contact the Undergraduate Research Advisor or your Concentration Advisor for help. In some instances, the lab may be able to provide some support.
Many fellowship programs, such as PRISE and Herchel Smith, require their fellows to give oral presentations or posters on their projects at the end of the program. Other fellowship programs, such as HCRP, require a written progress report. One reason for this requirement is that learning to communicate research results, either through an oral presentation or preparation of a poster or paper, is an important part of a scientist's training. Another important reason for requiring these presentations or papers is to ensure that students have taken some ownership and responsibility for their projects.

These presentations or papers are not expected to be final articles on your results, but rather progress reports on what you have accomplished thus far. If your program does not provide set guidelines for the paper, you should discuss it with your research mentor well in advance of the deadline; they may have advice or suggest a particular format. Don't plan to prepare an overly technical paper that emphasizes experimental details. Instead, we recommend that students focus their writing on the "big picture" - what are the scientific questions that led to your research project, and how does your project fit into the context of the field as a whole? Describe your hypothesis and explain how your experiments test that hypothesis. Include a summary of your experimental strategy, but avoid writing a detailed "methods" section unless your lab mentor or fellowship program requires you to do so or if your project involved developing or optimizing an experimental technique or protocol. If you have results you should describe them, and be sure to convey how your findings relate to your hypothesis. Your conclusion should summarize your project and focus on what the next steps should be. Do not worry if your results are unexpected, inconclusive, or even if you don't have any results.

The best thing to do is to be proactive and discuss the paper with your mentor(s) early in the writing process (at the very minimum, three weeks before the paper is due). It is likely that they have had similar experiences in their career, and they may have reassuring comments and advice to help you get started.

Funding for research done away from Harvard

Information about and links to summer fellowships for doing research away from Harvard can be found in on the Research AWAY tab for Harvard International Research fellowships and non-Harvard domestic and international fellowships.

Many rising sophomores and juniors take advantage of the several summer research abroad experiences offered by Harvard. Talk to your Concentration Advisor or the Life Sciences Research Advisor about help finding these opportunities. More information about programs and funding can be found in the FAQs section of this Handbook.

When problems arise

Communications breakdown

For the most part, the labs at Harvard have a good track record for providing positive experiences for their undergraduate researchers. However, as in any situation that relies heavily on personal interactions, problems may occur from time to time. Occasionally students find that communication with their mentor has become difficult or has completely broken down. There are many factors that can contribute to this: language or cultural misunderstandings, pressure because of workloads, differences in expectations, lack of progress on the project, or even just a mismatch in schedules that limits face-to-face conversations. Whatever the reasons, it is likely to be very stressful for both the student and the mentor. Early intervention by the PI or outside advisors may keep the problem from deteriorating beyond repair and allow the student to continue in the lab. If you find yourself in this situation, you should make an effort to talk to your lab mentor about the difficulty, but if that does not lead to a satisfactory outcome, you should arrange a meeting with the PI to ask for help in mediating the problem. The PI may want to meet with you individually or may suggest a joint meeting with your mentor. If meeting with the PI does not bring resolution, you may want to seek advice from a Concentration Advisor or the Life Sciences Research Advisor. But whomever you choose to talk to about this circumstance, we strongly recommend that you seek help before the tension between you and your mentor escalates. The sooner intervention is started, the better the chances are that a satisfactory resolution can be reached.

There are a number of ways that the situation might be resolved. Possible solutions that you and your lab PI or academic advisor might explore include:

- Providing your mentor with better training and clarifying their responsibilities to you
- Reassigning you to a new mentor in the lab
- Reevaluating the lab's expectations to more realistically reflect your time and level of expertise
- Providing you with more technical training
- Re-examining the project protocols and results
- Assigning a new project
- Setting more specific guidelines for your continued participation in the lab, particularly if attendance or focus in the lab is an issue

Project problems

Sometimes the student's project does not progress as well as either the PI or the mentor has anticipated. Obviously, this can create stress for everyone, especially if the lab is dependent on the results for a publication or making decisions about future directions on a related project. For this reason, many PIs will avoid giving students projects that may heavily impact the lab's immediate research goals. However, even if

the student's results are not critical to the lab at the moment, repeated experimental failures can be frustrating and discouraging.

Many factors can contribute to failed experiments including poorly designed projects, lack of sufficient technical training or expertise, untested protocols that aren't working, or just bad reagents. The list could go on. Troubleshooting failed experiments can be an arduous proposition and you likely will need help from others in the lab. However, it is helpful to accept this as another phase of your education in the lab and see it as a valuable process to experience in your training as a scientist. At the same time, it may be prudent to examine the underlying premises of the project or think about other ways that the scientific question might be addressed. Using this approach can lead to interesting conversations with lab mates from which you may benefit in the long run. The real question is how to know when it is time to just give up on a project and start over with a new one, but ultimately, that decision is up to the PI.

It is important for students to understand that nearly everyone who has ever worked in a lab has at some point experienced times of experimental difficulties and frustration; this is inherent in the research process. Often patience and thoughtful reevaluation of experiments will lead to solutions that overcome the technical problems.

Your research interests have changed or the lab is no longer a good fit

It is not unusual for students to find that their research or concentration interests evolve as they take more upper level courses and are exposed to more topics. When this happens, it is perfectly acceptable to change labs. However, because changing labs is a significant step, we recommend that students talk to someone in the lab or to a concentration or research advisor to confirm their decision and get advice on how to proceed. If you decide to change concentrations, you may wonder whether you will have to change labs as well. Some concentrations accept a broad range of projects as fulfillment of their research requirement, so it may be possible for you to remain in your current lab. If you change concentrations but decide that you would like to remain in your current lab, talk to your Concentration Advisor to see if your project fulfills the research requirement for that concentration.

If you do decide to change labs, you should notify your current lab in a timely manner so they can find another undergraduate to fill the position. The most diplomatic way to give notice of your intent to leave the lab is to request a meeting with your mentor and/or your PI so you can talk with them directly about your decision. Sending an email is not an appropriate way to convey such a significant decision unless there has been real tension between you and the lab that would make face-to-face communication very uncomfortable. Most PIs will understand and some may even help you find a new lab. Ideally, you would like to leave the lab on good terms and taking the time to meet with your PI to openly discuss how your research or concentration interests have changed

can help accomplish this.

Another reason that students might consider leaving their lab is if they realize that they have lost interest in doing research and bench work is simply not fun anymore. Bench research or fieldwork is not for everyone, so if after doing research for a summer or a couple of semesters you find that you do not enjoy what you are doing, it is perfectly acceptable to leave the lab. In some ways, it is better for a student who is not fully engaged in their project to leave the research group rather than stay on and continue working half-heartedly.

Your mentor leaves and there is no one to guide you

Postdocs normally remain in a lab for two to four years after which time many of them move on to positions in academe or industry. Sometimes their PIs will permit them to transfer the project that they have worked on in the lab as they move to set up their own research groups. When this happens, undergraduates may find themselves in the position of having to give up their part of the postdoc's project either because the project has moved with the postdoc or because there is no one left in the lab with enough expertise in the field to oversee their work. Obviously, this can be especially problematic for seniors who are close to writing their theses. Being proactive early may be the best way to avoid being caught in this situation. After you have developed the outline for your final project for your thesis, ask how long your mentor is planning to be in the lab and make sure that there will be someone else in the lab who can guide you through finishing your project and/or devising a new one if that is feasible. Usually the PI will be aware of the timing issue and will have made provisions to ensure that the student has a second mentor who can take over the advising role after the first mentor leaves and/or that the student is given a project that is not likely to be taken from the lab before their senior thesis is completed.

Your work does not meet expectations

Students accepted into faculty research groups are expected to make a sincere commitment to their projects and the lab's research goals. A student who repeatedly exhibits a lack of effort or interest in their research project may be asked to leave. Repeated sloppy and careless work and/or a demonstrated lack of respect for the mentor's time are among the indications that a student is not fully engaged in the research process. Usually the PI will meet with the student to discuss their concerns and seek a solution to the problem before asking the student to leave.

- Is the student uncomfortable with their mentor?
- Is the project too difficult or has it been poorly explained?
- Is the student in the midst of a particularly difficult "crunch" time?

However, in some cases it may be clear that the difficulty really lies with the student's attitude toward the lab or research in general and, in this situation, it is probably best for the student to leave the lab. If you find yourself in this position (or if

you realize that you have lost interest in your project before it becomes apparent to the lab), talk to your lab mentor or PI, your Concentration Advisor, the Undergraduate Research Advisor, or your Resident Dean about how to disengage from your lab commitment. It is much easier for everyone involved if you acknowledge that you have lost interest in doing research and are willing to explore other options for fulfilling your concentration's laboratory requirements.

In the event that you do encounter a problem in the lab, early recognition and intervention are the keys to increasing the chance that the issue can be resolved. Seek help from an advisor, tutor or your Resident Dean.

FAQs

Who do I contact for additional research advising?

For additional information on undergraduate research at Harvard email:

Anna (Anushka) Babakhanyan, Ph.D., MBT
Undergraduate Science Research Advisor
ababakhanyan@fas.harvard.edu
Faculty of Arts and Sciences
Harvard University
16 Divinity Avenue, BioLabs Room 1087
Cambridge, MA 02138

What are different science concentrations and how do I contact concentration advisors?

Life Sciences have 8 concentrations. Please visit our website for contact information.

How can I get academic credit for my research?

The Life Sciences Concentrations provide several options for obtaining academic credit for lab work. The normal route is for students to enroll in an independent research course in their junior year and a thesis course in their senior year. Some Life Sciences Concentrations require a semester of research for credit either through one of the lab courses or an independent project to be eligible for a degree; others do not. Your Concentration Advisor can help you design the best plan to fulfill this requirement. Students do receive credit for laboratory research done through one the Harvard Summer School courses including their Study Abroad programs. However, Harvard does not automatically accept credit for courses or research experiences offered by other universities or institutions. Therefore, check with your Concentration Advisor before enrolling in research or academic programs at institutions that are not affiliated with Harvard.

*Students **may not receive credit** for term time research while simultaneously getting paid either by their lab or through a Harvard fellowship such as HCRP.*

Do I have to stay with one lab while I am an undergrad?

The short answer is no, you are not required to remain in the same lab for your entire undergraduate career. There are many reasons for leaving a lab:

- your academic interests or concentration may have changed and thus the lab project is no longer appropriate
- your mentor may have moved on and there is no one in the lab to direct your project (although the lab should have planned ahead for this)
- the project may not be working and the lab hasn't offered an alternative
- or there may be personal reasons for leaving. It is acceptable to move on

If you do encounter difficulties, but you strongly prefer to remain in the lab, get help. Talk to your PI or mentor, or reach out to someone outside the lab for advice. The PI

may not be aware of the problem and bringing it to their attention may be all that is necessary to resolve it.

For students who are satisfied with their research experience, remaining in one lab for the duration of their undergraduate careers can have significant benefits. Students who spend two or three years in the same lab often find that they have become fully integrated members of the research group. In addition, the continuity of spending several years in one lab group often allows students to develop a high level of technical expertise that permits them to work on more sophisticated projects and perhaps produce more significant results.

Is it better to work in an FAS lab in Cambridge or at the Medical School and affiliated hospitals?

There are obvious advantages to working in labs on the Cambridge campus. The convenient location gives students more flexibility in their work schedules and less time is spent commuting on the M2 shuttle bus or the T. Students who participate in several extracurricular activities may find this option particularly appealing. However, because there are a limited number of labs in Cambridge, it may be more difficult to find space in one whose work aligns with your interests. For this reason, we suggest that students include at least a few labs that are located at Harvard Medical School or the Harvard affiliated hospitals in Boston on their lists of potential labs.

The advantages to working at one of the affiliated hospital or Medical School labs include:

- Having more potential labs to choose from and therefore a better chance of finding an opening in a lab that is doing work in your area of interest.
- Working in the Longwood Medical Area or one of the hospitals for the summer may provide more opportunities for premed students to do some physician shadowing.
- Keeping track of the time you are spending in the lab every week is easier if you have to plan ahead for the commute. This may be especially helpful during term time.

The obvious disadvantage of working off campus is the commute. At first, many students find it difficult to organize their schedule around the commute, but once they get started they often comment that it isn't so bad - most find that they can read and do some reviewing or light studying on the M2 or the T. The commute may, however, be more difficult during "crunch times" - for example, when students are spending long hours in lab doing experiments or writing their thesis. During those times, some students struggle to balance lab work with meals, House activities, and study groups; again, careful scheduling and planning is key.

The Life Sciences Education Office transportation program provides MBTA Charlie Cards during the term to Life Sciences students whose labs are located at sites not served by the M2, such as Mass General or McLean Hospitals. PRISE will cover the costs of commuting to their fellows who are working outside of the Cambridge campus in the summer.

Recent data taken informally on the distribution of students working in labs across the University suggest that students increasingly are finding that the advantages of working at off campus Harvard labs outweigh the disadvantages.

Can I take a summer off from my Harvard lab to do something else?

Many PIs will allow, or even encourage, rising sophomores or juniors to spend a summer exploring research opportunities outside of their Harvard labs. Below is some information about various options for engaging in summer research outside of Harvard. See the Research Abroad section of the Life Sciences Research webpage more complete information.

Harvard Summer School (HSS) offers several programs for students who wish to experience life sciences research abroad. Recent programs have included lab projects or research in Bonn, Germany; Shanghai, China; Tokyo or Yokohama, Japan; Bangalore, India and field research in Borneo, Malaysia. HSS also has offered a neurobiology course in Trento, Italy and a History of Science course in Oxford, England. These programs are very popular with students because they provide housing and include cultural immersion experiences, organized excursions and language courses. Students do not need to speak the language of the country where they will be working because the labs operate in English. Some of these programs are not offered every year so it is best to check the website in late fall to find out which of them will be available the following summer. Students are charged tuition to participate in these programs (some financial aid is available) but receive academic credit from the Summer School.

Students may also find their own labs abroad and seek funding through the Harvard Undergraduate Research and Fellowships Office (Herchel Smith), the Office of Career Services (Weissman and The David Rockefeller International Experience Grant for travel and research as well as others), the Student Employment Office (HCRP for research with a Harvard faculty member) and through the Office for International Education (Summer Study Abroad Grants). You can find help with this process by talking to the Concentration Advisors, the Life Sciences Research Advisor or staff from any of the funding offices. Note that credit is not normally granted for work performed in labs that are not part of a Harvard Summer School program.

For students who prefer to remain closer to home, many US universities offer summer research programs. A partial list can be found on the Life Sciences Research webpage. Harvard does not normally award fellowships to students participating in summer research programs at other institutions except those affiliated with Harvard Summer School. Ask your Concentration Advisor whether Harvard will accept credit for the program you are interested in before you apply. Do not assume that if you take a course away from Harvard you will automatically be granted credit after the fact.
Some PIs either do not allow or strongly discourage students from taking a summer “off” from their research commitment to the lab. Unfortunately, this policy may deny some students the prospect of participating in research in the context of a different culture and

prevent them from taking advantage of Harvard's commitment to providing international experiences for all students. For those students who are interested in going abroad for a summer during their undergraduate careers, it may prudent to broach the subject in the lab interview. If the lab policy is firmly against allowing students to "take a summer off" from the lab, it may make sense to look for a lab that is more flexible.

Where can I find information about summer research funding?

Harvard offers several summer research fellowships for students who want to work in Harvard labs. Information can be found on the Life Sciences Research webpage. Undergraduate Research Advisor or your Concentration Advisor can also help you find summer funding opportunities.

Is laboratory research required for admission to medical school?

You may be surprised to learn that the short answer to this question is "No." Basic lab research is not a requirement for many medical schools; however, students must demonstrate substantive engagement in an undergraduate project. This may be independent lab research, but it could also be clinical research or something in the area of public health or global health. What is crucial is that you become deeply involved with something that you are genuinely passionate about. It is far more beneficial for you to have a positive experience doing something about which you care deeply than it is to do a research project in a lab just because you feel you have to. For more detailed information about research for premedical students see the Office for Career Services Premedical Information for Harvard Students link. Note that a significant laboratory research experience is essential for admission to graduate school (PhD) and combined MD/PhD programs.

What is the greatest difference between basic and clinical research?

Many students are interested in pursuing medical research. Broadly speaking, there are two categories of medical research: basic research that involves studying fundamental questions such as the mechanisms of evolution, chemical reactions or the underlying causes of disease, which also may involve developing treatments for those diseases in the lab; and clinical research, which focuses on working directly with patients or analyzing clinical data. Since clinical research projects are, generally speaking, very long term and subject to lengthy approval processes, it is rare for undergraduates to be able to make substantive intellectual contributions to clinical research projects. Students engaged in clinical research are often limited to taking patient histories, inputting data into a computer, or analyzing the results of clinical trials; whereas students involved in basic research have the opportunity to design experiments to test hypotheses. Many concentrations do not accept clinical research projects for academic credit, therefore you should always check with the relevant concentration advisor(s) to ensure that the project you are considering is suitable.

What are departmental requirements for credit for independent research?

Contact your concentration advisor for the up-to-date departmental requirements.

Experimental Research Courses

Project-based experimental laboratory courses, such as Chemistry 100, Life Sciences 100r, and Organismic and Evolutionary Biology 100, are available to undergraduates who are interested in learning basic lab techniques and the process of research without making a commitment to a faculty lab. The courses are taught in laboratory space dedicated to undergraduate teaching and designed to accommodate research in a variety of fields. Students enrolled in these courses work on projects that are directly linked with ongoing faculty research in a highly collaborative and dynamic research environment. They provide an excellent introduction to research and research techniques and many students who take them go on to work in a faculty lab and write a senior thesis.

Introduction to Research Courses
Introduction to research courses, such as CPB 91R, SCRB 91R, HEB 91R, MCB 91R, NB 98R, PSY 910R, allow students to receive course credit for research carried out in a laboratory under faculty supervision for one term.

Laboratory Research for Honors Thesis
Laboratory research for honors thesis courses such as CPB 99, SCRB 99, HEB 99R, MCB 99, NB 99R, PSY990/992/993, are a full-year courses required for students intending to write a senior thesis.

Laboratory Methods Courses
Laboratory methods courses introduce students to novel experimental approaches in the field. Some of the examples include:
SCRB 160: Stem Cell and Regenerative Biology - Experimental Embryology
SCRB 165: Directed Differentiation of Stem Cells

Contact your Concentration Advisors to obtain advise on receiving a course-credit.

How can I find summer housing information?

- PRISE and a few other fellowships offer summer housing.
- DeWolfe Apartments: 10 and 20 DeWolfe Street apartments, owned by Harvard Real Estate Services and located at the intersection of Mill and Grant streets, are licensed to Harvard College students during the summer to provide housing for students who wish to remain in Cambridge for the summer. Applications normally open at the end of March.
- Other rentals in Cambridge can be found through local papers or on line listings.
- Students can find roommates to share apartments by using the Harvard College Undergraduate Research Association web based roommate finder or by posting to various House open lists.
- Phillips Brooks House Association summer programs

What are the Harvard student research or science associations?

The Harvard College Undergraduate Research Association is a big umbrella association for all research areas. Research groups for specific scientific areas are listed on our website.

How can I find out more information about student employment?

Student Employment Office provides job opportunities for undergraduate and graduate students.

Where can I obtain more information about Pre-Med requirements and advising?

Pre-Med advisers are available at the Harvard Office of Career Services.

Where can I present my research?

Harvard College Undergraduate Research Association holds NCRC conference each Spring. Science Education Office organizes Undergraduate Researcher Spotlights and the HUROS research fair, where students can present their research. Talk to the Undergraduate Research Advisor for more information.

Resources

Below is a selected list of advisors and administrators, including people to contact for questions about undergraduate research advising, concentrations, pre-med requirements, research fellowships and student employment and federal work-study.

Science Education Office

Associate Director of Science Education
Margaret A. Lynch, PhD
BioLabs Room 1087
16 Divinity Ave, Cambridge, MA 02138
margaretlynch@fas.harvard.edu
p: (617) 495-9533

Undergraduate Science Research Advisor
Anna (Anushka) Babakhanyan, Ph.D., MBT
16 Divinity Avenue, Biolabs Room 1087
Cambridge, MA 02138
p: (617) 495-7912
ababakhanyan@fas.harvard.edu

Life Sciences Concentration Advisors

Biomedical Engineering

BME Concentration Advisor
Assistant Director of Undergraduate Studies in Biomedical Engineering
Linsey Moyer
206C Pierce Hall
Cambridge, MA
lmoyer@seas.harvard.edu
p: (617) 496-2840

Chemical and Physical Biology

Assistant Director of Undergraduate Studies, MCB and CPB
Lecturer on Molecular and Cellular Biology
Dominic Mao
Sherman Fairchild Room 195, Cambridge, MA 02138
dominicmao@fas.harvard.edu
p: (617) 496-1206

Chemistry

Co-Director of Undergraduate Studies in Chemistry
Senior Lecturer on Chemistry and Chemical Biology

Gregg Tucci
Science Center, Room 114
tucci@fas.harvard.edu
p: (617) 496-4668

Cognitive Neuroscience & Evolutionary Psychology

Psychology Head Tutor
Jill Hooley
Harvard University Department of Psychology
33 Kirkland Street
Cambridge, MA 02138
jmh@wjh.harvard.edu
p: (617) 495-9508

Human Developmental and Regenerative Biology

Associate Director of Education, SCRB
Senior Lecturer on Stem Cell and Regenerative Biology
Bill Anderson
Fairchild G055
wanders@fas.harvard.edu
p: (617) 495-0950

Human Evolutionary Biology

Assistant Director of Undergraduate Studies for HEB
Lecturer on Human Evolutionary Biology
Carole Hooven
Peabody Museum 52-F, 11 Divinity Ave
hooven@fas.harvard.edu
p: (617) 496-3809

Integrative Biology/Organismic & Evolutionary Biology

Assistant Head Tutor, Integrative Biology
Lecturer on Organismic and Evolutionary Biology
Andrew Berry
BioLabs Room 1082B, 16 Divinity Ave, Cambridge, MA 02138
berry@oeb.harvard.edu

Molecular & Cellular Biology

Assistant Director of Undergraduate Studies, MCB and CPB
Lecturer on Molecular and Cellular Biology
Dominic Mao

Sherman Fairchild Room 195, Cambridge, MA 02138
dominicmao@fas.harvard.edu
p: (617) 496-1206

Neurobiology

Assistant Director of Undergraduate Studies, Neurobiology
Lecturer on Molecular and Cellular Biology
Ryan Draft
Ryan's website
Biolabs Room 1082A
16 Divinity Avenue, Cambridge, MA 02138
draft@fas.harvard.edu
p: (617) 496-9908

Associate Concentration Advisor for Neurobiology
Laura Magnotti
BioLabs Room 1082D
16 Divinity Ave, Cambridge, MA 02138
magnotti@fas.harvard.edu
p: (617) 496-2432

Physical Sciences Concentration Advisors

Astrophysics

Director of Undergraduate Studies
Edo Berger
Perkin Lab P-320
Harvard-Smithsonian Center for Astrophysics
60 Garden Street, MS-19
Cambridge, MA 02138
eberger@cfa.harvard.edu
p: (617) 495-7914

Chemistry

Co-Director of Undergraduate Studies in Chemistry
Senior Lecturer on Chemistry and Chemical Biology
Gregg Tucci
Science Center, Room 114
tucci@fas.harvard.edu
p: (617) 496-4668

Chemistry and Physics

Director of Undergraduate Studies
Professor Howard Georgi
Jefferson 456
georgi@physics.harvard.edu
p: (617) 496-8293

Associate Director of Undergraduate Studies
Dr. David Morin
Lyman Laboratory 238
morin@physics.harvard.edu
p: (617) 495-3257

Co-Director of Undergraduate Studies in Chemistry
Dr. Gregg Tucci
tucci@fas.harvard.edu
p: (617) 496-4668

Earth & Planetary Sciences

Co-Head Tutor
Francis Macdonald
p: (617) 496-2236
fmacdon@fas.harvard.edu

Co-Head Tutor
Jerry Mitrovica
p: (617) 496-2732
jxm@eps.harvard.edu

Environmental Science & Public Policy

Head Tutor
Bullard Professor of Forestry
Professor of Biology
Noel Michele Holbrook
Personal Website
holbrook@oeb.harvard.edu
BioLabs 3119
p: (617) 496-0603

Harvey Brooks Professor of International Science, Public Policy and Human Development
Harvard Kennedy School
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