Mentoring
Undergraduates in Summer Research

THE LEADERSHIP ALLIANCE

STEM

Mentoring
Undergraduates in Summer Research

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Contents

Get Ready to Mentor

Mentor Before Your Mentee Arrives

We're passionate about mentoring diverse undergraduates in summer research programs. This section introduces you to lessons we've learned since our founding in 1992, with a particular emphasis on the benefits, requirements, and responsibilities of mentoring diverse undergraduates in summer research.

- **Benefits**
- **Responsibilities**
- **Requirements**

The mentoring process begins before the summer starts. This section covers the steps to take before your student arrives for the summer, including setting expectations for the summer, fitting a project to your mentee, and handling any necessary logistical steps.

- **Clarifying expectations**
- **Fitting the project to the mentee**
- **Logistics**

Mentor During the Summer

This section covers best practices for making sure that working with your mentee is a productive experience for both of you. To that end, it includes tips for effective communication and attending to the academic, professional, and personal growth of your mentee.

- **The first week**
- **Research onboarding**
- **Communication**
- **Fostering independence**
- **Modelling the life of a researcher**
- **Emotional health**

Leadership Alliance National Symposium (LANS)

Attending and presenting at LANS will be a highlight of the summer for your mentee. This section introduces you to your role in getting your mentee prepared to present their research, network, and hone their professional skills at LANS.

- **Poster presentations**
- **Oral presentations**
- **Workshops**
- **Recruitment Fair**

Offboard and Mentor After Your Mentee Leaves
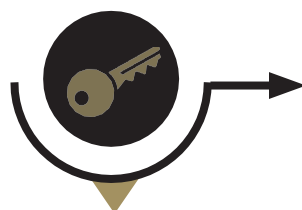
The end of the summer does not mean the end of your mentor-mentee relationship, just its evolution. Think of the experience as part of your mentee's overall "game plan" moving forward. This section discusses best practices for staying in touch and mentoring at a distance.

- **Networking**
- **Letters of recommendation**
- **Conferences**

Welcome to the Leadership Alliance Guide to Mentoring Undergraduates in Summer Research Programs

This guide will introduce you to mentoring undergraduates from diverse academic and cultural backgrounds who will join you for the summer to conduct research, acquire critical research skills, and better understand potential research career paths. It will cover general topics relevant to mentoring, such as setting expectations for the mentoring relationship and creating an inclusive learning environment, as well as topics specific to mentoring an undergraduate in the Leadership Alliance Summer Research — Early Identification Program (SR-EIP), such as choosing a project appropriate to the summer timeframe and mentoring toward participation/presentation at the Leadership Alliance National Symposium (LANS). Each section of the guide contains three types of resources to help you navigate the mentoring experience: 1) peer-reviewed literature on mentoring, 2) summaries of best practices and 3) short mentoring vignettes from members of the Leadership Alliance community, and mentoring resources such as checklists and interactive exercises.

The mission of the Leadership Alliance is to develop underrepresented students into outstanding leaders and role models in academia, the public, and the private sector. This goal is still relevant today as we strive to meet the national demand for diverse leaders to compete in a global economy. Since its founding in 1992, the members of the Leadership Alliance consortium have committed themselves to fostering a more diverse workforce by mentoring diverse students at critical transitions along the academic pathway. SR-EIP has been a cornerstone of that effort. SR-EIP is a fully paid summer internship that provides undergraduates with training and mentoring necessary to conduct research and pursue competitive applications to PhD or MD-PhD programs. Since 1993, the SR-EIP has engaged thousands of undergraduates in intense summer research experiences at some of the nation's most competitive research universities. Nearly half of SR-EIP students have not previously participated in an external undergraduate research program. Similarly, nearly half are enrolled at a Minority Serving Institution (MSI). Nearly two-thirds of our most recent SR-EIP cohort were women. The diversity of our students extends to their interests as well. SR-EIP offers closely mentored research experiences in the life and physical sciences, the social and behavioral sciences, and the humanities at research institutions across the country.

The Leadership Alliance
Commitment to Outstanding Mentorship

We offer this guide out of our passion for and expertise in mentoring. Leadership Alliance faculty and administrators have distinguished themselves as mentors at their home institutions and as part of Leadership Alliance programming. As a consortium of dozens of research and teaching institutions, we have been able to marshal best practices and lessons learned in diverse settings. In pursuit of our mission of mentoring along the critical pathways, we have applied mentoring best practices to emerging researchers at diverse career stages. Training and mentoring begin for first-year undergraduates during the academic year with workshops that build key academic skills and introduce undergraduates to research pathways. Opportunities continue during the summer with the First-Year Research Experience (FYRE), which enables undergraduates from Alliance MSI's to conduct research in the SR-EIP. Undergraduates at varied stages and in myriad disciplines present their research at LANS. For graduate students, postdocs, and junior faculty, attending LANS is also an opportunity for mentoring and professional development in our Career Development Workshop and Grant Writing Coaching Groups, where they build skills and meet mentors that help them bring a truly diverse and representative research workforce into being. Leadership Alliance alumni mentor and inspire undergraduates beyond LANS during the academic year through our Speaker Series, where they share their stories of becoming researchers and transforming the research workforce.

To date, these efforts have resulted in over **900 Leadership Alliance Doctoral Scholars,** each of whom is an alumna or alumnus of a Leadership Alliance program and has obtained a PhD or MD-PhD. These outcomes are due in no small part to the role of mentors in the SR-EIP. Evaluations of our programs bear this connection out. In 2022, almost 90 percent of SR-EIP participants found that the program was "extremely useful" or "very useful" in increasing their self-confidence as a researcher (84 percent) and ability to work independently (85 percent). Participants were also asked to rate their mentors across 17 individual indicators. Mentors were consistently rated as "excellent" or "good" across all categories, from "being available to discuss and respond to questions about your research" (90 percent) and "offering guidance and advice on your research" (89 percent) to "valuing your input" (91 percent) and "making you feel like an integral part of the research project" (89 percent). These ratings reflect the effective mentoring behaviors that have contributed to making SR-EIP as valuable as it is to its participants. This guide compiles mentoring resources to support Leadership Alliance mentors in their efforts to optimize their relationships with diverse scholars.

The Leadership Alliance is a 2010 recipient of a Presidential Award for Excellence in Science, Mathematics and Engineering Mentoring, presented by the office of the President of the United States to individuals and organizations embodying excellence in mentoring underrepresented students and encouraging their significant achievement in science, mathematics, and engineering.

The Benefits, Responsibilities, and Requirements of Being a Mentor

The Benefits of Mentoring

Whether you are a new mentor assembling your mentoring toolkit or an established mentor staying up to speed on emerging issues in mentoring, this guide will help you and your mentees get the most out of the mentor-mentee relationship. Doing so starts from a recognition that mentoring is a two-way street. Dr. Carole Bland describes mentoring as a relationship that helps "mentees successfully acquire the key competencies and constructive work relationships they need to lead a successful and satisfying career," is "collaborative," and ultimately "develops over time and passes through specific phases." (Bland, 2012) Effective mentoring has several benefits for mentees. Effective mentoring promotes academic persistence and degree attainment. Students who have effective mentors have a greater sense of self-efficacy and research identity. They also have a greater sense of belonging within their academic communities (Pfund et al., 2016). You should learn and grow just as you help your mentee to do the same (McGee, 2016; Pfund et al., 2016). One of the great *benefits* of mentoring is the opportunity to gain new knowledge and develop new skills. Other significant benefits of mentoring include but are not limited to: seizing the opportunity to "pay it forward" when it comes to the knowledge and experience you have gained over your career, fulfilling a commitment to the ideals and goals of scholarly research, seeing your own research in a new and clarifying light, growing your research network, honing your teaching skills, and leaving the future of the research process in good hands. Experiencing these benefits depends on recognizing both the *responsibilities* and *requirements* of being a mentor.

Responsibilities

Your responsibilities as a mentor include but are not limited to:

- **Assessing** your mentee (and helping them to self-assess) to identify the academic, professional, and even personal areas in which you can help your mentee grow. As a mentor, you possess a much broader view of the skills and qualities a student needs to enjoy a successful career as a researcher. It will be up to you to get to know your mentee so that you can guide them to experiences conducive to their growth.

- **Collaboratively developing** a shared plan and set of expectations with your mentee. You and your mentee should both be on the same page regarding the work your mentee will be doing over the summer (and beyond, if applicable) and what to expect from each other.

- **Cultivating** an environment for growth. Students who feel well integrated into the research process and the community of scholars around them are more likely to persist in their majors and go on to graduate school (Gloria and Robinson-Kurpius, 2001; Tinto, 1993). As a research mentor, you are uniquely positioned to make that happen

(McGee, 2016). Ensure that your mentee becomes a part of your team, feels free to ask questions, and is not subject to microaggressions, which are defined as "brief, everyday exchanges that send denigrating messages to certain individuals because of their group membership" (Sue, 2010), stereotype threat, which is defined as "being at risk of confirming, as a self-characteristic, a negative stereotype about one's group" (Steele and Aronson, 1995), or implicit bias, which refers to the phenomenon of a negative or positive unconscious belief about members of different groups.

ADDITIONAL RESOURCES **Implicit Bias, Stereotype Threat, and Microaggressions**

Students who feel assured that "their abilities and belonging are assumed rather than doubted" invest more in and grow more from the tasks and assignments their mentors give to them (Cohen and Steele, 2002). Microaggressions, even when inadvertent, lead to students feeling marginalized and stereotyped while simultaneously undercutting your position as someone who your mentees can trust to be a fair and caring mentor.

To interactively learn more about common microaggressions in academia, go to www.fairplaygame.org (Pribbenow and Kile, 2015). To read more about the effects of stereotype threat in the context of cross-race mentoring, see "A Barrier of Mistrust: How Negative Stereotypes Affect Cross-Race Mentoring" by Geoffrey L. Cohen and Claude M. Steel (2002).

- **Nurturing** through regular feedback. The frequency with which mentees get feedback from their mentors is closely related to mentee productivity (Allen et al., 2010). Make a plan to meet with your mentee on a regular basis or be sure that your mentee will have regular meetings with someone on your research team. Regular meetings will help your mentee stay on track regarding their work and the skill-acquisition process. Frequent feedback will keep you and your mentee accountable to each other.

- **Challenging *and* supporting** your mentees. Dr. Laurent Daloz emphasizes that mentee growth depends on mentors both challenging and supporting their mentees. Effective mentors challenge their mentees by giving them difficult and even perplexing tasks, introducing new concepts, and setting ambitious expectations. Effective mentors also support their mentees by helping them develop creative solutions to problems, expressing empathy, showing confidence in their abilities, and serving as an example that the journey to becoming a researcher is possible despite universal difficulties (Daloz, 2012). Regular check-ins will help you make sure your mentee's project is a good fit with appropriate challenges and that they are getting the support they need to grow.

- **Instilling confidence and independence** in your mentee. Nurturing, challenging and supporting your mentee should ultimately bring your mentee greater confidence in themselves and independence from your guidance. "Successful mentoring relationships can be measured by a mentee's success in reaching individual milestones that allow him or her to progress to the next stage along the trajectory for a sustainable career" (Pfund et al., 2016).

BEST PRACTICE: Grappling with Unconscious Bias

Dr. Natalie Strobach
Former Director of Undergraduate Research, Krieger School of Arts and Sciences, Johns Hopkins University

Unavoidably, students visiting from other institutions will come to you with different attitudes, levels of experience, and areas of expertise than the students from your home institution. While you will be taking practical steps to acclimate these students to their new research environment, it's important to be alert to any unconscious bias that might make it harder for you to effectively welcome them. Unconscious bias is only human, but making conscious efforts to recognize and correct for that bias is an ethical imperative.

For example, low-income and first-generation college students often have fewer family resources, both financial and social, to support them in their summer work; this can impact their experience in unexpected ways. You should consider that some challenges a student may face may reflect their situation more than it reflects their inherent motivation or value as researchers. It certainly doesn't help that visiting a prestigious university lab can be intimidating in itself!

In general, while most university faculty know to be on guard for internal biases related to race, religion, or sexuality, there are a number of other biases we pay less attention to, ranging from economic class to "invisible" disabilities ranging from depression to dyslexia. As a mentor, your duty is to first engage with students transparently and honestly by inviting them to share any challenges they may be experiencing that may be impacting their self-confidence and their performance, while also working with them to develop solutions. The simple fact that these students have made it into a highly selective summer research program suggests that they already have the tools to succeed; your task is to help them adapt those tools to their new, unfamiliar situation.

In addition to guarding against biases, it is also important to actively engage in practices of inclusion and accessibility, such as selecting social activities that don't include financial and emotional barriers to participation as well as maintaining group workspaces and norms that work for your mentee.

Mentoring Requirements

In addition to these **responsibilities**, effective mentors should strive to satisfy the following **requirements**:

√ **Preparation** — Be sure that everything is ready to go before your mentee arrives for the summer, especially with respect to your mentee's project and anyone who will help supervise it. If a postdoc or graduate student will be working with your mentee, share this guide with them.

√ **Adequate Time** — Your mentee must be able to meet with you and/or someone you oversee on a regular basis. Be sure you will have enough time to dedicate to your mentee over the course of the summer given all of your other personal and professional obligations.

√ **Sufficient Accessibility** — Your mentee must be able to approach you with questions and concerns in order to grow. Be sure you will have time to check in with your mentee regularly and respond attentively to them. If you plan to be away from campus for travel over the summer, arrange for ways to be in regular contact with your mentee.

√ **Thoughtful Project Selection** — Your mentee's project should be manageable enough to complete in your time together, but challenging enough to serve as a learning experience (Wilson, 2003). Consider projects that 1) allow for small successes over time to build confidence, 2) connect with the larger goals of the research team, 3) provide a variety of experiences from reading to observation to experimentation, and 4) have clear, measurable goals. Be sure you can provide a project with these elements and can create a well-crafted learning experience.

√ **Alignment of Interests** — Your research agenda should align with your mentee's interests. Your mentee is coming to you because they are passionate about research and have an interest in a particular topic, area of study, or discipline. Aim to have the work they do for you capitalize on that interest. In the context of mentoring a summer research undergraduate, your interests and their interests may not align perfectly. That is okay. Build your mentor-mentee relationship around the overlap in your interests and explore your areas of difference.

√ **Willingness to Prioritize the Mentee's Growth** — Unlike graduate students and research assistants, an undergraduate mentee's project should aim to help them master skills and concepts even if it means they may not advance your research agenda (Wilson, 2003). Consider that you should only agree to mentor a student if you are willing to guide an undergraduate without the guarantee of useful new data or research material.

√ **Flexibility and Growth** — The needs of a typical mentee change over time and across stages of the mentoring relationship. Check in regularly to see what needs your mentee has and then do your best to leverage best mentoring practices to meet those needs. In addition, continue in your own professional development by staying abreast of new developments in mentoring. For example, the term "microaggression" was not in the vocabulary of most mentors until recently. Recent efforts to learn about and address microaggressions are important because unconscious bias can have significant adverse effects on mentees who are members of historically underrepresented groups (Hurtado et al., 2009). Effective mentors are willing to continually learn both what to do and what not to do to help their mentees grow.

Dr. Ja'Wanda Grant
Vice President and Dean of Students, Maryville College

Effective mentors both get to know and identify with students they are supporting who are planning to participate in a summer research experience. As in any context, it is essential to know your mentee. What are this student's interests? How can this summer research experience supplement what they are studying at their home institution and thereby open doors to new opportunities? Is this summer research experience the first time that the student is traveling far from home? Strive to answer these and related questions in order to tailor and target your guidance. There is no such thing as one-size-fits-all support for students, so you can effectively support your students only after you have gotten to know your students. It is also essential to be able to identify with your students because supporting your students so often goes hand-in-hand with challenging them as well. Mentors like to encourage students to embrace a challenge. You should ask yourself if you are practicing what you preach. Are you embracing new opportunities to grow that challenge you? Doing so will help you identify with your students, which will make your guidance that much more authentic and resonant.

Evaluating Applications for Mentoring

It is important to consider the potential success of a research mentoring relationship and the alignment between yourself and a mentee even as you are evaluating applications from prospective undergraduates. If there isn't a good mentoring "match" between you and the mentee, then both you and the mentee would both be better served by working with other people. To help you think about whether a given prospective mentee is a good match, fill out the following checklist, which has been modified from *Faculty Success Through Mentoring* (Bland, 2012). If you will be part of a mentoring team or will have graduate students or postdocs working with the student, ask those co-mentors to fill it out as well.

☐   1.   I (and my team) have a sincere interest in helping this person succeed.

☐   2.   There appears to be mutual interest and compatibility.

☐   3.   I am clear about my role.

☐   4.   I am the right person to help the mentee achieve his or her goals.

☐   5.   I can enthusiastically engage in helping this person.

☐   6.   I am willing to use my network of contacts to help this individual.

☐   7.   I can commit adequate time to mentoring this person.

☐   8.   I have access to the kind of opportunities that can support this person.

☐   9.   I have the support that I need to be able to engage in this relationship in a meaningful way.

☐   10.   I am committed to developing my own mentoring skills.

(For more on this checklist and its companion checklist for mentees, see Bland, 2012, p. 68-70)

Mentoring Before Your Mentee Arrives for the Summer

I f after reviewing the roles and responsibilities above, you are ready, able and willing to take on a mentee for the summer, it is important to start the relationship off on the right foot. This section describes how to prepare for the process of mentoring a summer research undergraduate before your mentee ever arrives on campus. Keep three objectives in mind during this critical period: clarifying and aligning expectations, fitting the project, and managing the logistics before the mentee's arrival.

VIGNETTE: The Mentoring Match

Dr. Ruth Gotian
Chief Learning Officer in Anesthesiology
Weill Cornell School of Medicine

Content and process expertise is only one part of mentoring. The style of mentoring has to match if the partnership is to be fruitful. Style-matching has been important for me as a mentor *and* as a *mentee.*

When I started my doctoral research, I had a topic that I was passionate about. It was all I could think about and all I could talk about. I am an extrovert, and though I hadn't realized it at the time, I now know that I need to talk through my ideas, challenges and thoughts. I need to be challenged via dialogue.

When looking for an advisor, I interviewed various faculty members in my department, starting with the obvious choices. They were brilliant, likable, had an incredible work ethic and were leaders in their field. They were also completely wrong for me. One kept giving me articles and books to read, another kept telling me what was wrong with every idea I had, another focused on minutia. I could do the work under their tutelage, but my excitement would quickly wane.

A friend saw me one day looking frustrated and recommended that I speak with his doctoral advisor. After a one-hour phone conversation, I knew I had found the right mentor. She loved to talk as much as I did! Via dialogue, my mentor challenged me and made me critically think in ways I never had before. She raised the bar so high, I often wondered if I could reach it. Knowing that she supported me made all the difference. I pushed myself harder than I ever did before, hoping to impress her as well as myself.

To be an effective mentor, consider how you learn best. Do you prefer to work in isolation or groups? Do you prefer to read through a problem or talk it out? Recognizing that need within yourself will help you adjust to your mentee.

Clarifying and Aligning Expectations

Your mentee will be forming a set of expectations about you and the project before coming to campus. Effective mentors help to shape those expectations by reaching out early to start a dialogue with their mentees. Early dialogue allows the mentor to gauge the mentee's skills and interests, be transparent about the work the mentee will do, and discuss the characteristics of their working relationship. Mentoring compacts can be especially useful in this regard. Examples compacts can be found at https://ictr.wisc.edu/mentoring/mentoring-compactscontractsexamples/ in *Entering Mentoring*. (Pfund, 2014) They also allow the mentor to convey background information about their research area, the norms and culture of the department or research team, and what to expect in regards to campus community and culture.

Mentee anxiety is common in mentor-mentee relationships. (Allen et al., 2010) You can ease some of that anxiety by getting in touch with your mentee before the start of the program. Doing so also provides you the opportunity to learn more about your mentee's research interests and personal background. Likewise, your mentee will have the opportunity to learn more about you and your research, which will put them in a better position to hit the ground running when they arrive. During those conversations be sure to assess any gaps that you think may arise between your mentoring style and what you anticipate your new mentee's strengths and needs to be. Activities that can help shape these initial conversations can be found in *Entering Research.* (Branchaw et al., 2010) As Dr. Ruth Gotian writes in 'The Mentoring Match,' "the style of mentoring has to match if the partnership is to be fruitful." If you think the fit could be improved, take the opportunity to make adjustments to your style, tailor your mentee's project, or be in touch with a colleague, postdoc, or graduate student who can help out in a team-oriented way.

Project Fit

Just as you and your mentee must be a fit, so too must the project be a fit for the mentee. The project your mentee undertakes should help them grow as a researcher, learn a new research skill or skills, acclimate to the life of a researcher, and creatively solve research related problems. Your mentee should also work on a project that relates to the goals of your lab and is tractable within the context of a summer research experience. As noted above, **identify a project for your mentee that has a well-defined goal that can be met over an eight-to-ten-week period and lends itself to a research presentation at LANS at the end of July.**

Select a project that can be changed or adapted in the event the core experimental approach or design cannot work for technical reasons. Be sure to have alternative techniques or designs at the ready. Doing so will ensure that your mentee has a meaningful research experience and relatively little downtime. If you need to switch, walkthrough the decision-making process with your mentee — this can be an excellent teaching moment.

Be aware that SR-EIP participants and students participating in summer experiences at Leadership Alliance host sites will be sharing their results at LANS. Tailor the project and its timeline so that your mentee will have something meaningful to present by mid-July when SR-EIP participants begin to prepare their presentations for LANS.

Logistics

Ensure that key pieces are in place for your mentee's research project as well as their transition to campus and into your research team. ***Time flies during a summer research fellowship. Aim to put your mentee in a position to start getting up to speed as soon they arrive.*** Attend to the following before the mentee arrives:

Be sure:

1. There is a safe and accessible workspace for your mentee.

2. Share background reading(s) relevant to the work your mentee will undertake over the summer and communicate to them what you want them to get out of reading the material (e.g. come up with three questions per reading, write a short summary, underline all the terms that are new to you, etc.).

3. Set up training sessions in all relevant health and safety regulations and procedures for your lab.

4. Identify a contact person in case of emergencies.

5. Find out about any additional commitments that your mentee has through their summer program. For SR-EIP participants, these commitments can be discipline-specific, enrichment-oriented, intended to provide a supportive network, or a combination of all three. For example, many SR-EIP participants are members of mandatory seminars, take GRE classes, and participate in mandatory social outings.

6. Have a conversation with the coordinator for the SR-EIP program at your campus to be briefed on what they will be doing to help onboard your mentee. Also, have a conversation with someone from your mentee's home campus to get a sense of the environment from where your mentee will be coming and their background experience(s). If your mentee is coming from a Leadership Alliance institution, speak to your mentee's Institutional Coordinator and faculty advisor. They will have the greatest familiarity with SR-EIP as a whole, as well as your mentee's academic profile.

7. If the mentee will be working with someone else on your research team, meet with that person to coordinate expectations and encourage that person to reach out to the mentee directly before they arrive.

8. Plan some introductory activities for the mentee such as a tour of the department or campus, a team meeting, departmental seminar, or a get-to-know-you lunch with the research team, etc.

Mentoring During the Summer

This section discusses best practices for ensuring that your mentoring relationship will be a productive experience for both of you throughout the summer. It includes tips for maintaining regular contact and fostering an effective relationship with your mentee. It also discusses the multiple dimensions of an effective mentor-mentee relationship. In addition to growing as researchers, the summer is an opportunity for your mentees to grow personally and professionally. As a mentor, you will be in a position to foster that growth.

BEST PRACTICE: The Mentor/Mentee Contract

Dr. Natalie Strobach
Former Director of Undergraduate Research, Krieger School of Arts and Sciences, Johns Hopkins University

To start your relationship with your mentee off on the right foot, the two of you need mutually understood goals and expectations. A contract between you and your mentee, customized to the expectations for the relationship and your mentee's project, is a good way to achieve that understanding. This document should include both what the mentee can expect from you (e.g., how often you will meet, what type of support you can offer) and what you will expect from them. Perhaps most importantly, completing and customizing the contract should require you and the mentee to work together to set project deadlines and timetables. For many undergraduates, the summer research experience is the most independently-driven research they will have undertaken; having expectations clearly articulated, laid out in advance, and discussed on matters ranging from professional conduct to time spent in the lab will make both of your lives less stressful.

The First Week

The first week of a summer research experience is crucial for setting the right tone and navigating the complex onboarding process. During that first week, take time to meet with your mentee to go over the project. Define your expectations and carefully walk through the logic of the project, as well as its broader significance. Set up a schedule of regular check-in meetings with your mentee (and co-mentors, if applicable). Aim to have check-ins once a week at specific, fixed times. You may also want to discuss expectations for preparing for these regular meetings and follow-ups afterwards. Mentoring compacts can help articulate these expectations from the beginning.

Sample Mentor/Mentee Contracts/ Compacts

For examples of mentor/mentee compacts, visit the following site for a compilation of compacts from the Institute for Clinical and Translational Research at the University of Wisconsin-Madison: https://ictr.wisc.edu/mentoring/mentoring-compactscontracts-examples/

Research Onboarding

As a research mentor, you will need to bring your mentee up to speed both on the project on which they will be working as well as the larger research context into which it fits. Effective mentors connect the research they have a mentee working on to the broader goals of their research agenda and how that contributes to the overall field. This conversation should continue through regular meetings to review work progress as your mentee's understanding of the broader significance grows over the course of the summer.

> **BEST PRACTICE:** The Global Meeting
>
> **Dr. Carlos Aizenman**
> *Professor of Neuroscience, Brown University*
>
> **When someone new** is coming on board, it's good to step back and say, "here's what we're doing, here are the different projects, and here's everybody's role." Then everybody knows exactly what everybody else is doing, there are no surprises, and everybody knows how their piece might fit into the bigger project. When you're doing a PhD, you own the project and are the project manager. But for other projects where you are a summer trainee or an undergrad, obviously, that has to be part of a larger effort. You have to be given a global picture to understand what's going on with that larger effort. It also helps students become better at understanding the picture of why they're doing what they're doing. If you ask an undergrad what their project is, they will give you a very literal description of what they're doing without much context. For example, "I am testing to see if these cells have sodium currents." These descriptions leave out the "why." Global overviews can help them understand and articulate the "why," which is a necessary part of becoming a scholar.

We have learned over more than two decades of mentoring diverse undergraduates that making your student feel like they are a part of your research community is vital to a quality research experience. (Hurtado et al., 2007). In the first week, take time to help your mentee get to know the members of your lab, members of your department, and any administrators with whom you regularly work. Your goal should be to help your mentee make as many connections with people in your research community as you can. Your mentee will learn best when they have the chance to encounter multiple, diverse perspectives within a research community.

Use the first week to explain the project, the relevant background literature and how to review it, and key methodologies. Discuss various methods of scientific investigation with your mentee. Keep in mind that mentees with limited research experience may not be familiar with diverse methods of inquiry. Ask your mentee explicitly about research methods they may have used in the past and their understanding of the methods they will use in the summer program. Use various methods to assess your mentee's understanding from asking open-ended questions, to having them convey ideas back to you, to illustrating ideas or even teaching another student something they have learned.

> **BEST PRACTICE: Language — Slowing Down to Speed up**
>
> **Dr. Sharon Rounds**
> *Associate Dean for Translational Research, Professor of Medicine, Brown University*
>
> **Don't assume** any background knowledge or experience. We forget how green we were as undergraduates, particularly with language, lingo, and terminology. You have to be careful to remember that these young students don't understand your jargon as yet. We have to really open our communication to explain things clearly — as if we're talking to a layperson. Students learn faster when you go slower.

Make sure your mentee receives any necessary formal training in laboratory safety according to your institution's requirements. Whenever possible, include your mentee in the formulation of the underlying hypotheses and expected outcomes of the experiments. Discuss the hours your mentee is expected to maintain. Brief your mentee in detail on how to keep relevant lab records. Outline your mentee's role in lab meetings and any other required meetings or seminars.

If a postdoc or senior graduate student is assigned to co-mentor and supervise your mentee, explain this relationship. Make sure your mentee understands the role of other individuals in the lab. Your mentee should know to whom various questions should be addressed and ought to feel comfortable relying on a lab colleague for certain types of assistance. Selection of this individual is crucial to the overall experience of the summer mentee. Make sure that this person is prepared to work with SR-EIP participants. They must be familiar with the schedule and demands of an SR-EIP participant. They should also be committed to being regularly and easily available to your summer mentee. Many SR-EIP participants belong to historically underrepresented groups. Consider asking a co-mentor to participate in mentor training if it is offered on your campus. This postdoc or graduate student must be thoroughly trained in avoiding microaggressions and reducing stereotype threat.

1. Establishing Durable and Open Lines of Communication

A successful summer research experience for your mentee depends on regular communication with you (Cho et al., 2010). At the beginning of the summer, be willing to be proactive in setting meetings with your mentee. Many summer research students may be nervous about imposing on your time and may feel insecure about their relative inexperience.

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Professor of Surgery, Brown University

The students are intimidated to speak with us. They come in with no previous experience. They feel very self-conscious, and they don't want to appear foolish. They are anxious about communicating with you. They're not eager to come into your office to tell you how much they don't know. Mentees new to a research laboratory need a period of acclimation and during the period it is difficult for them to initiate conversation about the subject matter they are studying. I like to tell mentees and mentors to be proactive in building a relationship, but early on mentees most often don't know enough to formulate questions. The best way to get past that is for them to become engaged and for that to happen students need to feel intellectually safe. The safer they are made to feel the more they will participate and grow. It is a cooperative but self-fulfilling prophecy. Mentees should be made to feel comfortable with what they don't know and made to feel respected for their willingness to take on a foreboding adventure in the lab.

You can instill a sense of communicative self-efficacy in your mentee by setting a regular schedule to meet with your mentee and making them comfortable with coming to you with questions and concerns both during that meeting and outside of it. Encourage your mentees to pursue a deeper understanding of the work they are doing by asking thoughtful questions. Facilitate this dynamic by fostering an atmosphere that makes a mentee feel empowered to ask questions. Emphasize that all kinds of questions are welcome. That sense of communicative self-efficacy will, in turn, lead to greater proactivity on the part of your mentee. Your first meetings are crucial for establishing that level of comfort. As the summer progresses, you will have opportunities to foster a greater sense of independence from within that comfort zone. If another faculty member or graduate student is also helping to supervise your mentee, encourage lines of communication between them and your mentee as well. Team mentoring can be very effective for giving your mentee multiple avenues of support and feedback.

ADDITIONAL RESOURCES **Take a "Communications Inventory"**

Many mentors find it helpful to take a "Communications Inventory" to gain perspective on their communication styles and to see what tools they would like to add to their communication toolkits. MindTools offers the following quiz to help with communications self-assessment: https://www.mindtools.com/pages/article/newCS_99.htm

ADDITIONAL RESOURCES **The 10/20/30 Rule**

Mentee growth is at the heart of the summer research experience. Your mentee should come away with new research skills, greater fluency in the professional norms of your discipline, and a deeper knowledge of the literature. As their mentor, you are in a position to foster that growth. Because this can be a lot to cover, one mechanism for making sure you are addressing all dimensions is the "10/20/30"

rule for meetings (Weber-Main, 2012a). For a one hour meeting, use the first 10 minutes to engage in a personal check-in. Make sure your mentee is comfortable in their role and with the other members of the research team. For the next 20 minutes, discuss "front-burner" issues. Review the work they've done since you last met and any issues that have come up. For the next 30, discuss current and upcoming priorities — both regarding research and professional skills. Make sure to clearly articulate the goals set for them and go over what they need to do to meet them. When giving feedback be sure to acknowledge *both* your mentee's successes as well as areas for growth.

2. After the First Week: Moving from Onboarding to Independence

Getting Your Mentee Used to a New University

Chances are that your SR-EIP participant is new to your institution. Be sure to facilitate your mentee's integration into the research community at your home institution. There is almost always a significant culture shock for undergraduates going to another university for the summer. This expectation is true of undergraduates moving between research-intensive universities as well as undergraduates coming to a research-intensive university from a teaching-focused institution. The same holds true for undergraduates moving both between and within Minority Serving Institutions (MSI's) and Predominantly White Institutions (PWI's). Consider the opportunity to help acclimate your mentee to your institution to be a valuable teachable moment. As future researchers, these undergraduates will have to move between institutional research settings. Showing them the ropes of this process can help to foster a sense of identity as a researcher. Do not be shy about sharing your own experiences with academic culture shock.

BEST PRACTICE: Supporting Your Undergraduates Who are Going Away to Conduct Research

Dr. Tonya Hargett
Retired Director, Office of Research Compliance and Ethics, North Carolina Agricultural and Technical State University

Students are eager to participate in a summer research experience. This is especially true at N.C. A&T. When mentoring students toward a summer research experience, we have learned mentors still need to spend time assuring students, especially freshmen and sophomores, that they are just as capable as students from other institutions of completing a research experience at a different institution successfully. Some students, especially those early in their undergraduate career, are apprehensive when considering participating in a summer research experience at another institution in unfamiliar territory. To ease the apprehension, we created a support system for students that allows them to have access to key personnel when they need insight, guidance, or an ear to vent. We also leverage these experiences to empower students to encourage their peers to participate in experiences in less familiar areas. Creating an effective support system has perpetuated the interest of students to apply for and complete summer research experiences away from their home institution.

Pushing Your Mentee Toward Independence

As you get to know your mentee, you'll be able to gauge what might be appropriate challenges for them — especially regarding fostering mastery and independence concerning the key techniques they will be using and the literature within which their research is situated. Think about what milestones of independence would be good for your mentee to reach and what strategies might help your mentee get there (Huskins et al., 2011, pp. 443–445).

> **ADDITIONAL RESOURCES** **Independence Milestones**
>
> The following examples of independence milestones are modified from a recommended exercise contained in *Optimizing the Practice of Mentoring*. You will need to register for this free online course, supported through partnership with the National Mentoring Resource Network and hosted by the University of Minnesota. For more information, visit
> https://ctsi.umn.edu/training/mentors/mentor-training
> (Weber-Main, 2012)
>
> - Designs proper experimental controls
> - Creates effective research subject recruitment plans
> - Critically evaluates the literature
> - Masters one or two key techniques
> - Contemplates potential pitfalls of an experimental design
> - Practices good time management and life/work balance
> - Exhibits confidence in decision making
> - Solves problems on their own

Modeling and Mentoring the Life of a Researcher

Beyond cultivating the skills of a researcher in your mentee, you are also modeling and teaching your mentee about the life of a researcher (Kram, 1983; Ritchie and Genoni, 2002). Discuss career options with your mentee and how the various choices they will make in their remaining undergraduate studies can contribute to different career paths. Talk about how graduate school plays into the pursuit of those different career paths. When possible, give your mentee a firsthand perspective of core professional responsibilities common in research careers in some of your day-to-day tasks such as reviewing journal articles, running staff meetings, or applying for grants.

The Emotional Health of Your Mentee

Emotional well-being plays a significant role in determining research persistence (Lent et al., 1994). Hanauer et al. (2016) found that levels of "positive emotive responses to the laboratory research experience" could predict nearly 50 percent of the variance in STEM persistence among undergraduates. As a mentor, you are in an important position to support your mentee as they navigate the challenges of research, which are often emotional in addition to intellectual and technical (Kram, 1983). Emphasize the importance of maintaining an appropriate work/life balance. Talk with your mentee about how to respond to the frustrations of a failed experiment. Knowing that stress and setbacks are navigable parts of a research career will be valuable for your mentees as they move deeper into research. Sharing your experiences of overcoming challenges you faced as an undergraduate can be particularly helpful here. Likewise, underscore as accomplishments activities that are routine for you as a senior researcher. The gap between where your mentee is and where you and even your graduate students are can seem insurmountable from your mentee's perspective. Make sure your mentee sees their progress over the summer as the victory that it is. If you have an opportunity to highlight your mentee's talents or progress in a public forum, do so (Kram, 1983, p. 614).

Reach out to your institution's Summer Research Coordinator, as well as your mentee's advisors from their home institution if something related to your mentee's physical or emotional health appears to be negatively impacting your mentee's summer research experience. Be sure to observe all relevant policies for confidentiality and reporting responsibility.

Be sure to review your university's disciplinary policies so that you know where your mentee should turn if they have been involved in a matter that requires disciplinary attention. In addition to being in touch with your institution's Summer Research Coordinator, it is especially helpful to know who your university ombudsperson and Title IX coordinators are in the event that they may be able to help.

Mentoring Toward the Leadership Alliance National Symposium (LANS)

We require every SR-EIP participant to make either an oral or poster presentation at LANS, which takes place the last weekend in July. For many participants, presenting their research at LANS is the highlight of their summer. As a research mentor, you will be in a position to contribute to their preparation for that experience.

- Speak with your institution's Summer Research Coordinator so that you are familiar with the requirements applicable to your mentee.

- With those requirements in mind, keep an eye on the project's progress and make sure that it is getting enough support to be ready for LANS.

- Counsel your mentee on the choice between an oral presentation or a poster.

- Create opportunities for your mentee to practice their oral or poster presentation; provide feedback on the poster or presentation materials.

- Representatives from graduate schools attend LANS. Recommend/ discuss graduate schools your mentee can learn more about at the recruitment fair.

- Practice ways they can network at a graduate school event.
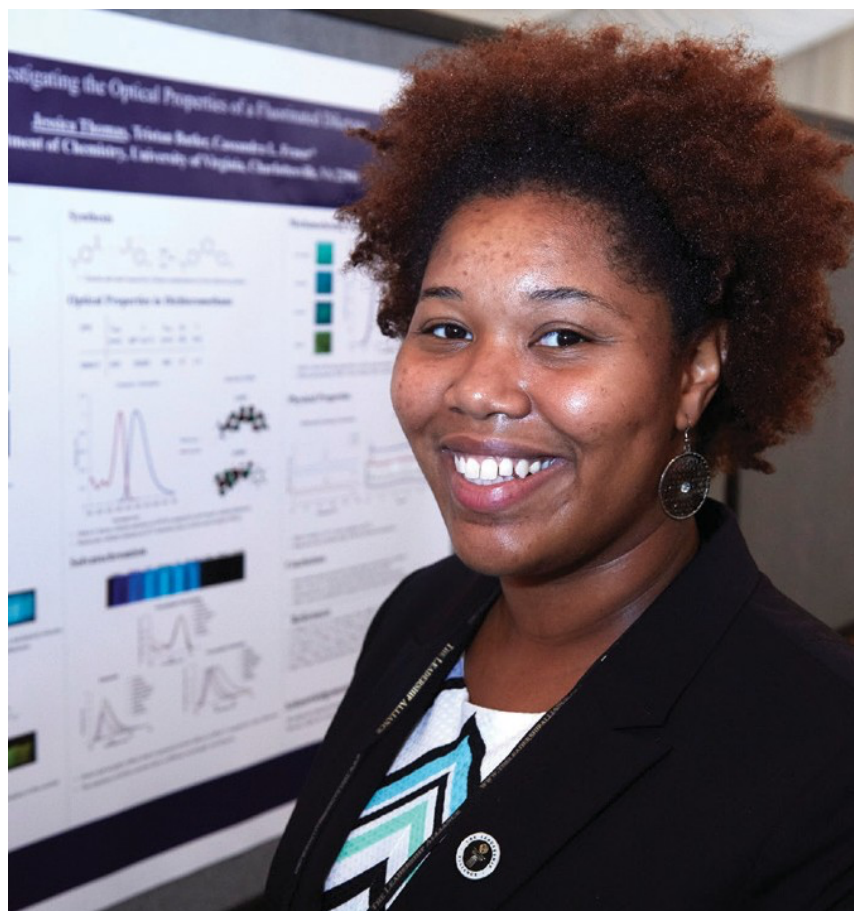
Offboarding and Mentoring
After the Research Experience

Mentees have reported that the transition back to a normal undergraduate schedule from a full-time research schedule can be akin to returning from study abroad. Higher education researchers increasingly understand the significance of "re-entry shock" in such contexts (Wielkiewicz & Turkowski, 2010). The more an undergraduate has been successful in immersing themselves in the culture of full-time research, the greater difficulty they may have in returning to the rhythm of the academic year. This form of culture shock can sometimes be more difficult than the one your mentee experienced during the summer because it is rarely anticipated. Having a conversation about it with your mentee can help prepare them for it.

During that conversation, talk with your mentee about pursuing "Course-Based Research Experiences" (CRE's) when they get back to their home institution. If their home institution does not have formal CRE's, suggest ways your mentee can go about setting up an independent study at their home institution or at other institutions located nearby. If you are willing to speak with the research mentor they'd like to work with upon returning to their home institution, let your mentee know that they can use you as a resource in setting up that independent study.

In your last meeting with your mentee, offer either written or oral feedback based on the summer experience. Couple that appraisal with an action plan for your mentee. Many mentees are eager to maintain the research momentum they have acquired over the summer. Advice from you on how to do that can fuel that momentum.

Many undergraduates will also go on to build upon their research by presenting at undergraduate research conferences at their home institutions and by applying to national conferences such as the Annual Biomedical Research Conference for Minority Students (www.abcrms. org) and the National Conference of the Society for Advancement of Chicanos/Hispanics and Native Americans in Science (www.sacnas. org). You should also consider and suggest any conferences sponsored by disciplinary and professional societies at which your mentee can present. If your mentee plans to do so, you will be in an especially strong position to provide valuable feedback on your mentee's conference proposal.

Letters of recommendation will often be among the most important elements of your mentee's future applications to other summer research experiences and graduate school. Be proactive about letting your mentee know how much prior notice you need to write one and whether you would like to see their other application materials (such as their statements of purpose, transcript, or resume).

Leadership Alliance mentors have learned that it can be particularly productive to introduce mentees to colleagues with whom they think the mentee might be a good research fit. For the mentee, establishing these new relationships expands their mentor network and deepens their sense of belonging to a research community. Your colleagues — and your department as a whole — get the chance to recruit a new graduate student. SR-EIP participants matriculate to Leadership Alliance graduate programs at a high rate in no small part because they have a chance to meet and bond with the faculty in those programs.

You may also consider including your mentee as a coauthor on papers in which the work they've done for you contributes materially to the finding. Inclusion as a coauthor, when it makes sense, can be an incredible catalyst for a mentee's career.

If you are developing a mentor/mentee compact for after the summer (see Chapter 2), cover these aspects of your mentor/mentee relationship. Do the same for being in touch in the future to discuss other questions your mentee may have, such as navigating their major, developing a thesis, and picking a graduate school. By the end of the summer, you will be a new member of your mentee's mentoring team. Think of a mentor/mentee contract as part of your mentee's overall "game plan" moving forward.

Conclusion

Mentoring, particularly mentoring along the critical transitions to a research career, is growth-centered. Your mentees, particularly summer research mentees, have the opportunity to grow by conducting research, acquiring critical research skills, and gaining a better understanding of research careers when they work with you. Likewise, you gain new knowledge and develop new skills by working with your mentees. Every serious mentor who goes through the process of mentoring becomes a learner in their own right. We hope this guide nurtures that growth process, whether you are a first-time mentor or a seasoned veteran.

The Leadership Alliance's successes over the last 30 years are due in large part to the quality of our mentors, many of whom contributed to the writing of this guide. These mentors consistently emphasized that the benefits of mentoring come with attending to the responsibilities and requirements of being a mentor. The most effective mentors assess their mentees to identify potential areas of academic, professional, and even personal growth; collaboratively develop a shared plan and set of expectations with their mentees; cultivate an environment for growth; pay special attention to eliminating implicit bias, stereotype threat, and micro-aggressions from those environments; nurture through regular feedback; and instill both confidence and independence in their mentees by exposing them to significant challenges while simultaneously offering rich support. These activities require a mentor to have time for and be accessible to their mentee, a tractable project that fits their mentee's interest, and a willingness to prioritize your mentee's growth.

Mentees can and should be challenged in order to grow and they should be supported to an equal degree. In concrete terms, effective summer research mentors set mutual expectations and establish lines of communication early. They take particular care during the first week to set the right tone and make sure the complex onboarding process gets navigated properly, especially concerning bringing their mentees up to speed on their research project and the larger research context into which it fits. They help their mentees with the emotional difficulties of research challenges in addition to the technical ones. They likewise take particular care to integrate their mentee into the research team of which they'll be a part and the academic community of their host institution. Taking these steps puts effective mentors on a solid footing to foster skill acquisition and independence in their mentees.

Resources for a Deeper Dive

We hope you have enjoyed the preceding Guide to Mentoring Undergraduates in Summer Research Programs. For a deeper dive into the practice of mentoring, read *Entering Mentoring,* by Dr. Christine Pfund and colleagues (2014), available at www.cimerproject.org, or take the University of Minnesota's *Optimizing the Practice of Mentoring: An Online Curriculum for the Professional Development of Research Mentors,* which is available for free at https://ctsi.umn.edu/training/mentors/mentor-training

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"Mentoring is about having an interest in the person and trying to understand where they are coming from and what they need. I try to provide whatever is going to be most valuable to them — whether it's networking opportunities, feedback on their work, practical information, or pathways to emotional support."

Ana Carneiro
Assistant Professor of Pharmacology
Vanderbilt University

Leadership Alliance Member Institutions

The Leadership Alliance