The Office of Undergraduate Research and Community Outreach

The Mentoring Guide

MENTORING UNDERGRADUATES: A GUIDE FOR MENTORS

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ACKNOWLEDGEMENTS

The Office of Undergraduate Research and Community Outreach would like to thank the Leadership Alliance for permission to modify their mentoring guide to meet our program needs. Through our continued collaboration with the Leadership Alliance, we are able to enhance the research programs we offer our students and provide resources to our faculty mentors.

INTRODUCTION

Our mission is to provide mentored research experiences to undergraduate students in all disciplines, increase the representation of minorities in the sciences by providing financial support of undergraduate studies and provide outreach in the community through support of research at Miami Dade College and public/private K-12 school systems. We are funded jointly through university funds and external grants.

We hope to foster and support students in scholarly research endeavors to help them achieve their personal and professional goals as undergraduates and to prepare them for their next challenge. To make this a reality, we encourage and support faculty throughout our campuses to succeed as research mentors.

Faculty who serve as mentors make a valuable contribution to the education and training of undergraduates interested in hand-on experience in scholarly activity. Students judge their research experiences primarily by their interaction with their mentors. Thus, the role of the faculty mentor in a research program is crucial to the program's success. This brochure is designed to: 1) assist the faculty mentor to understand the available research opportunities to undergraduate students, 2) clarify the expectations of student and mentor participation, and 3) provide some resources and tools to enhance the mentor-student research experience.

Faculty members choose to mentor because of a commitment to the ideals and goals of scholarly research. They understand that a successful mentor-student relationship requires a significant investment of time and energy. Because it does not yield an immediate, tangible benefit, some faculty consider the role of a mentor an altruistic endeavor or professional responsibility. Although not every mentor-student relationship is successful, mentoring has the potential to be an extraordinarily rewarding experience for both parties. We hope this guide will help faculty and students make the most of this opportunity to learn, share and teach one another.

Our office provides interdisciplinary research mentor matching services to any qualified undergraduate. Students can experience research on a continuum from providing assistance in a research project to conducting and reporting research on individual projects. Many of our students volunteer their time in research. Some students receive course credit or stipends to participate in research. Because of the vast opportunities available to students, the expectations of the mentor vary.

UNDERGRADUATE RESEARCH STUDENT/ MENTOR EXPECTATIONS

Research Volunteer (Most UM Undergrads fall under this category)
A student who requests a research experience and is not seeking university credit or other compensation is known as a research worker. He/She is generally requesting a research experience that will enable him/her to understand better the role of research in a given field of study. The student is expected to dedicate at least six hours a week to the research experience, assisting the mentor in appropriate research activities. The experience is typically for one semester but can be expanded or adapted into a Student Researcher position with the agreement of the student and mentor. The mentor will be responsible for negotiating a work schedule and providing the student with a successful research experience. The mentor and the student will be asked to complete a Research Worker Evaluation at the end of each semester. No grade will be required.

Student Researcher (May also begin as a Research Volunteer and transition to Student Researcher for credit)
A student who has requested an opportunity to participate in research for university credit or other form of compensation is a Student Researcher. Different research mentor departments have special courses listed as independent research under faculty. Before a student registers for a research credit course, they must meet with the faculty member to obtain her/his approval to enroll in the class. The research course can count as credit towards the student's major. The Student Researcher should discuss this with their advisor and faculty member. She/he will determine the requirements to obtain credit. It is suggested that the student dedicate at least 10 - 12 hours a week to research, assisting the mentor in appropriate activities. The student is generally required to participate in the project for one or multiple semesters and work independently with little direct supervision. The mentor and the student will negotiate a mutually agreed upon schedule. The mentor will be asked to help the student formulate a research hypothesis to test within the mentor's research area. The mentor will then guide the student in developing a proposal and conducting the appropriate research. This will involve helping the student prepare for presenting their research. The mentor and the student will be asked to complete a Student Researcher Evaluation at the end of each semester. If necessary, the mentor will be asked to assign a grade to the student's work on a semester basis. Generally, the deliverable at the conclusion of the research experience may be a research paper and /or a poster presentation.

SPECIAL RESEARCH PROGRAMS

Florida-Georgia Louis Stokes Alliance for Minorities Program (FGLSAMP) Student Researcher

An FGLSAMP Student Researcher is required to participate in research as partial fulfillments of the conditions of his/her grant funding. He/she is required to develop a research proposal. The student usually has career plans that involve research in the future. To be successful as a FGLSAMP Student Researcher, the student will be required to develop a research proposal and submit a research paper. The student is expected to dedicate at least 10 to 12 hours a week to research assisting the mentor in appropriate research activities. The student is required to participate in the project for multiple semesters and able to work independently with little direct supervision. The mentor will be asked to help the student formulate a research hypothesis to test within the mentor's research area. The mentor will then guide the student in developing a proposal and fulfilling the student's research requirements for the grant contract. This often involves helping the student prepare for presenting their research. The mentor and student will be asked to complete a FGAMP Student Researcher Evaluation at the end of each semester. If necessary, the mentor will be asked to assign a grade to the student's work on a semester basis.

Bridge Scholar Student Researcher

A Bridge Scholar Student Researcher is a second-year Miami-Dade College student who is required to participate in research as partial fulfillment of the conditions of our NIH grant funding. The student has career plans that involve research either in a PhD or MD/PhD program. The Bridge Scholar Student Researcher will be required to develop a research proposal and submit a research paper. The student is expected to dedicate at 10 to 12 hours a week to research, assisting the mentor in appropriate research activities. Students are paid hourly and mentors must verify their time for payment records. The student is required to participate in the project for multiple semesters. The student will often be able to work independently with little direct supervision. The mentor will be asked to help the student formulate a research hypothesis within the mentor's project. The mentor will then guide the student in developing a proposal and fulfilling the student's research requirements for the grant. This will involve helping the student prepare for presenting their research. The activities will include:1) preparing an abstract, 2) writing a research paper, 3) preparing research presentation in the form of a poster or PowerPoint. The mentor and student will be asked to complete a Bridge Scholar Student Researcher Evaluation at the end of each semester.

Summer Student Researcher

A Summer Student Researcher has accepted a position in an intensive summer research program. The student may be a University of Miami student or may be visiting from another university. The student usually has career plans that involve research in the future. The Summer Student Researcher will be required to develop a research proposal, conduct research, and report on findings within a ten week summer period The student is expected to dedicate approximately 40 hours a week to fulfill the requirements of the research program. Students are generally paid a stipend. This time is to be spent actively involved in conducting research. The student will often be able to work independently with little direct supervision. The mentor will be asked to help the student formulate a research hypothesis within the scope of the mentor's research area. The mentor will: 1) guide the student in developing a proposal 2) conducting the appropriate research 3) writing a research paper and 4) preparing research presentation in the form of a poster or PowerPoint. This may involve helping the student prepare for presenting their research. The mentor and student will be asked to complete a Summer Student Researcher Evaluation at the end of the summer experience.

Summer High School Student Researcher

As a special program within our HHMI grant we offer a community outreach summer experience to qualified high school juniors and seniors. These students participate in mentor-guided research teams (two students in a team). Their summer experience is seven weeks long and the students are expected to commit 40 hours a week to their research project. The students are paid a stipend or receive community service research hours. The teams are required are required to submit a short scientific paper and a give a PowerPoint presentation at the end of the program.

ROLE OF A MENTOR

One of the key characteristics to a successful mentoring experience is the willingness to guide, instruct and assist students to reach their research objectives. Beyond serving as an advisor or supervisor on a research project, the mentor takes an active interest in the student's academic and professional development as a scholar. The ideal mentor seeks to quickly establish a positive working relationship with the student to promote confidence, student inquiry, focus, and discipline. As a mentor your responsibilities can be divided into three parts: your role prior to the student's start date, your role upon the student's arrival and your role at the end of the research project.

Communicate Effectively

- Successful navigation of the mentor-student relationship requires the establishment of effective communication from the start. As a mentor, you must be sensitive to issues of ethnicity, culture, gender, sexual orientation, and academic preparation.
- Do not make assumptions about prior knowledge by under or overestimating academic skills and abilities. Regularly encourage your student to speak up if there is something that is not understood, and then take the necessary steps to fill in any gaps in knowledge.
- Based on the student and the nature of their research experience you may need to adjust your level of hands-on guidance. Some student may be capable of relatively independent work and others may need or the situation may dictate a more guided experience. Discuss your concerns with the student and with our office as they arise.
- Do not hesitate to give critical feedback when necessary but temper it with kindness.
- Promptly communicate to program administrators any problem that may arise with your student so they may resolve the issue as quickly as possible.

Prior to Arrival of the Student

- Review the student's application so that you may familiarize yourself with the student's coursework, research experience, and interests. Assess your student's interests, knowledge, and ability.
- The student will contact you to set up an interview. During the interview suggest some tentative projects or proposal ideas, and provide students with preparatory reading material (If a student is from another university participating in summer research contact the student by phone or e-mail with this information). Providing information in advance about your area of research will facilitate your student's initiation of a research project. Thorough preparation prior to the beginning of the research assignment will convey a positive message to your new student.
- If your student will be working primarily with a graduate student or post-doctorate, explain this and provide some information about the person.
- Make sure there is adequate space for your student to work.
- Recognize that non University of Miami students here for the summer may be nervous about beginning a new research experience. By contacting summer research students prior to their arrival, you can begin to put them at ease while you learn more about their interests and background.

Upon Arrival of the Student

- You or a designee should meet with your student immediately upon arrival to discuss the project and expectations. This is a good time to clear up security clearance issues and explain any regulatory issues regarding safety and other policies that may apply. Take the time at

ROLE OF A MENTOR, CONT.

Upon Arrival of the Student, Cont.

these initial meetings to clearly define your expectations and make sure the logic and rationale of the project is clear to your student.

- Develop and adhere to a schedule of regular meetings with your student (and co-mentors, if applicable). Ideally, meetings should occur at a fixed times, more regularly at first but with some regularity throughout the experience.
- If you are not on campus for a period of time, continue to keep in touch with your student via e-mail or phone. You should make sure that someone is on site to handle unforeseen problems.
- Make an effort to get to know your student on an informal basis. Sharing a meal or even a cup of coffee gives you the opportunity to develop a more informal relationship.
- Talk about various issues associated with choosing and preparing for graduate school and what it means to be a professional in your field. Discuss career options with your student and the importance of making the most of his/her remaining undergraduate studies.
- When possible, include your student in some of the day-to-day tasks of your professional responsibilities, i.e., grant writing, staff meetings, data analyses, editing journals, etc.
- If the student is expected to make either an oral or poster presentation at a professional conference or in an academic setting, review the presentation data the student will use, and, if possible, help your student prepare presentation materials. If your student elects to give a poster or oral presentation, try to set aside some time at least a week before the event to stage a mock presentation with an audience.
- Regular communication with your student is a fundamental element of a successful research experience. Do not let a week pass without communicating with your student at least once. If you can't meet face-to-face, talk on the phone or send an e-mail. Do not underestimate the value of informal conversation. These can be productive and revealing exchanges. Involving your student in some of your professional activities is an excellent way to convey a sense of your professional life.

At the Conclusion of the Program

- Provide written evaluation to the Office of Undergraduate Research and Community Outreach. You may choose to present the evaluation to your student, as well.
- If satisfied with your student's performance, offer to write letters of recommendation.
- Let your student know if you are available for advice and counseling in the future.
- Share your impressions of the student with program administrators, and give them feedback on any suggestions you may have for improving the program. It is very important for students to receive constructive criticism of their performance during their research experience.
- Be aware that your comments and suggestions about the program and your experience as a mentor are highly valued by the program administrator. You are encouraged to provide feedback on a regular basis. We are interested in improving the experience for mentors and student researchers. Please contact our office at any time and complete formal evaluations with suggestion on how we may help you in your mentoring responsibilities.

MENTORING STUDENTS IN THE SCIENCES

The culture that surrounds the student doing scientific research often involves working in a laboratory as part of a team. Assessing your student in advance and helping him or her to acclimate as quickly as possible to your laboratory environment will set the stage for a constructive research experience.

Orientation

- Use the first few meetings to explain the project, consider relevant background literature and review techniques, including computer software. Make sure your student receives any necessary formal training in laboratory safety, in accordance with your department's requirements.
- Develop a tentative schedule for completion of various aspects of the project, and discuss the hours your student is expected to maintain.
- Clearly explain the rules for keeping a laboratory notebook and other lab records.
- Outline your student's role in lab meetings and any other required meetings or seminars.
- If necessary, explain the role of the graduate student or post-doctorate as mentor. If a post-doctorate or senior graduate student is assigned to co-mentor and supervise the student, explain this. Make sure the student clearly understands the role of other individuals in the lab. The student should know to whom various questions should be addressed and ought to feel comfortable relying on a lab colleague for certain types of assistance.
- Be sensitive to cultural issues and misunderstandings that may occur between the research student and the post-doc or graduate student. Have the post-doc or graduate student become familiar with the philosophy and goals of the Office of Undergraduate Research and Community Outreach by sharing this document and your views about mentoring undergraduates.

Formulating a Research Project

- It is essential that students are supplied with some materials to familiarize them with your field of research as well as your lab's research goals and techniques prior to arrival or upon arrival. Continue to encourage them to read relevant materials that arise during the course of the project.
- A Student Researcher during the academic year should have a clearly defined two to four page research proposal within first six weeks in the laboratory. The proposal should include the following: 1) title; 2) background & logical context; 3) significance of project; 4) clear statement of the general question and the specific objectives; 5) methods that will be used and explanation of how the methods will provide the data necessary to answer the question; 6) key references to relevant publish work. Students should submit the proposal to the Office of Undergraduate Research and Community Outreach.
- A Summer Student Researcher should have a clearly defined research project by the end of the second week of the program so they have adequate time to pursue the work in appropriate depth over the summer. It is critical that students come up with a few research questions they can realistically address within the timeline you've established together.
- Your student should conduct work that relates to a specific aim of the research goals of your lab. Identify a project with a clearly definable goal and scope that can be reasonably attained within the time available. Both one term, multi-semester, and summer students will need assistance developing a timeline to follow for successful completion of their project.

MENTORING STUDENTS IN THE SCIENCES, CONT.

Formulating a Research Project, Cont.

- Whenever possible, include your student in the formulation of the underlying hypotheses and expected outcomes of the experiments. Make sure students are thoroughly trained in the appropriate set of techniques and understand their relevance to the project.
- It is important that your student understands the project's relevance to the broader scientific goals of the lab, as well as the lab's overall contributions to its scientific field. This can be discussed in regular meetings with the student while reviewing his/her progress in the lab or the assigned literature.
- Do not assign a project that depends on a single technique, given the possibility that the technique may not work.
- You should anticipate alternate approaches or parts of the project to assign to your student in the event that he/she is unsuccessful with the original assignment. Considering alternatives in advance will help ensure that the student has a meaningful lab experience and relatively little "downtime."

Asking Questions

- It is essential that your student learns how to ask questions that will yield a greater understanding of the work conducted in your lab. Suggest to your student write down questions and bring them to share during regular meetings. You might suggest that the student use a research journal or log to write down questions to address with you. The journal or log will help him/her focus and become a learning document to reflect upon.
- Stress the importance of asking appropriate questions, particularly during critical periods, in order to move the research forward.
- Strive to create an atmosphere that makes a student feel empowered to ask questions, and reassure your student that it's okay to ask all kinds of questions. Do not make him/her feel inferior while learning to formulate better questions. Remind the student that there is no such thing as a "bad" or "dumb" question, particularly in research!
- Do not hesitate to ask hard questions of your student but do not forget that he/she is still a novice in your discipline and may lack some basic academic preparation.

Methodologies

- Discuss various methods of investigation within your discipline with your student. Keep in mind that students with limited research experience may not be familiar with diverse methods of inquiry.
- Ask students explicitly about research methods they may have used in the past and question them about their understanding of methods they will use.
- Cite examples of the kinds of methods and techniques that can be used to address research questions.
- Instructing a student in laboratory techniques should include an explanation of the techniques, not simply a demonstration.

MENTORING STUDENTS IN THE HUMANITIES AND SOCIAL SCIENCES

Research in the humanities and social sciences is distinctly different from laboratory-based research experiences. Because of the nature of the research, students need to clearly understand the expectations inherent in this environment. Some social science research environments (e.g., those that involve administering surveys or running subjects through research protocols) share some similarities with laboratory-based research environments, so you may find some helpful suggestions in the previous section.

Orientation

Research in the humanities and social sciences is often conducted in libraries, going through primary and secondary sources and sorting through information that may yield potentially interesting data. It entails significant amounts of time spent on one's own, wrestling with the research question, writing, and interpreting data. Keep in mind the following suggestions for preparing and supporting students as they work independently.

- At the initial meeting, work with your student to develop a research plan that includes short-term and long-term goals as well as a timeline for completion of the work.
- Inform your student realistically about how frequently you will be able to meet with him/her and when. If you have a heavy travel schedule or will be away for a significant length of time, make sure the student is aware of this. Provide ways to ensure the student can continue to receive feedback while you are away, e.g., via e-mail or phone calls.
- Tell students that it is their responsibility to contact you if they need anything. Remind them that independent, self-directed work often defines humanities and social sciences research but it does not mean that they should not seek help if they are confused or unsure about the direction of their research.
- Discuss the resources that are available to the student as he/she pursues independent research. Mention the services offered in university libraries and explain the roles of archivists, reference librarians, information technology experts, database managers and curators. You may wish to encourage the student to make arrangements to meet with these professionals.
- Let your student know how often you will provide feedback. Provide corrective feedback with empathy and kindness.
- Discuss the level and the amount of writing that is expected over the course of the research project, and let him or her know the number of drafts you expect.

Defining a Research Project

- Students may arrive with a specific research project in mind or they may simply have a broad interest in the field. You must help the student define a project that is realistic within the given time frame of the research program but will also allow the student to be introduced to the depth and breadth of the available literature.
- Listen carefully to the student's perspective about the kind of research they wish to pursue. Ask the student to share an article or essay as an example of the work he/she would like to do. Question your student about familiarity with the available literature to help you gauge his/her knowledge of the field.

MENTORING STUDENTS IN THE HUMANITIES AND SOCIAL SCIENCES, CONT.

Defining a Research Project, Cont.

- If appropriate, discuss ways in which ethnicity, culture gender, sexual orientation, socio-economic status and other characteristics help to expand the types of questions asked in a particular discipline and the various methodologies used for answering them.
- A Student Researcher during the academic year should have a clearly defined two to four page research proposal within first six weeks in the laboratory. The proposal should include the following: 1) title; 2) background & logical context; 3) significance of project; 4) clear statement of the general question and the specific objectives; 5) methods that will be used and explanation of how the methods will provide the data necessary to answer the question; 6) key references to relevant publish work. Students should submit the proposal to the Office of Undergraduate Research and Community Outreach.
- A Summer Student Researcher should have a clearly defined research project by the end of the second week of the program so they have adequate time to pursue the work in appropriate depth over the summer. It is critical that students come up with a few research questions they can realistically address within the timeline you've established together.
- Once the project has been defined, help your student assemble a reading list to provide some direction and guidance. Although you may have a particular bias about the research, you should provide competing hypotheses and divergent theories. Help your student understand how diverse perspectives have come about and provide examples of how his/her research can be placed in the context of these different perspectives.

Asking Questions

- Discuss with your student the importance of learning to ask appropriate questions, particularly during critical periods, in order to move the research forward.
- Do not hesitate to appropriately challenge assumptions held by your student about his/her research topic but remember that your student is still a novice in your discipline.
- Encourage your student to write down all of the questions he/she has and bring them to share during regular meetings. Be open to exchanging ideas with your student. Strive to create an atmosphere that makes a student feel empowered to ask questions. Help your student learn to formulate better questions but do not make him or her feel inferior while doing so.
- Model how to ask questions within the context of the discipline. Help the student clearly delineate the different levels of questions and the kinds of questions to ask during the research process. For instance, broad research questions need to be honed down to specific questions related to the data or information found. This in turn will lead to different levels of analyses and additional questions.
- Research in social sciences and humanities relies on the ability of the investigator to pose good questions and then find the appropriate primary and secondary resources necessary to answer these questions. Students must recognize their questions may require understanding of a wider variety of disciplines than they may have originally considered.

Methodologies

- Researchers in the social sciences and humanities utilize a wide variety of both qualitative and quantitative methods in their research. It is important for you to discuss the appropriate qualitative and quantitative methodologies currently used in your discipline. Keep in mind that students with limited research experience may not be familiar with diverse methods of inquiry.

MENTORING STUDENTS IN THE HUMANITIES AND SOCIAL SCIENCES, CONT.

Methodologies, Cont.

- Ask students explicitly about research methods they may have used in the past and question them about their understanding of methods they may use in the project.
- Provide a variety of examples of the kinds of methods that can be used to address research questions. You may also wish to provide readings that contain examples of how various research methods have been used by other researchers.
- If the project requires survey instruments, archival materials or large databases, arrange for your student to meet with appropriate professional staff for training in the use of these resources.

CONCLUSION

The Office of Undergraduate Research and Community Outreach is deeply grateful for your contribution of time and effort expended to mentor our students. Mentors are the anchor for student success in any chosen research experience, and your hard work and dedication are sincerely appreciated. Because we offer varied research opportunities to undergraduates of all disciplines, the expectations for students and mentors can be confusing. If you are unsure of your role in any stage of the mentoring process, please feel free to contact the program administration at 305-284-5058. We are also interested in your feedback and comments.