FRIB Graduate Student Mentoring Plan

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Revision History

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None.

Authorized Documents

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None.

Named Program Roles

None.

Awareness Training

None.

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None.

1 Introduction

The education of graduate students is a core mission of FRIB. As a university-based DOE Office of Science user facility, FRIB plays a prominent role in the education of the next generation of nuclear and accelerator scientists through a close synergy of high-quality classroom education and cutting-edge research throughout the student's entire graduate career.

About 140 MSU graduate students are advised by faculty at FRIB and have their offices at the Laboratory. Their research revolves around the scientific opportunities in experimental, theoretical and astrophysical nuclear science, radiochemistry, as well as accelerator science and engineering. The majority of support comes from a variety funding sources and fellowship opportunities, predominantly from DOE, NSF, NNSA and MSU. About 15% of the nation's nuclear science Ph.D.'s are trained at FRIB. The median time-to-Ph.D. degree for students at NSCL is 5.5 years (measured for completions between 2019 and 2024), which is significantly below the national median of 6.3 years as reported in the 2022 NSF report on "Doctorate Recipients from U.S. Universities" [1].

MSU graduate students performing research at FRIB are enrolled in graduate programs in the College of Natural Science (Department of Physics and Astronomy (P&A) and Department of Chemistry) and the College of Engineering (Department of Electrical and Computer Engineering (ECE), Mechanical Engineering (ME), Chemical Engineering and Material Science (CHEMS)). The relevant departments have graduate student handbooks [2-4] that describe the rules and guidelines for the relevant programs and for the mentoring provided by Ph.D. guidance committees chaired by the student's advisor.

More than a decade ago, it was decided to strengthen the mentoring framework for graduate students through the creation of the position of the Associate Director for Education, now the Associate Director for the Office of Education, Workforce and Career Development (abbreviated as ADE in the following). Part of the role of the ADE is to institutionalize accepted best practices listed in this mentoring plan, monitor their effectiveness, make adjustments based on feedback from faculty, students and others, and to develop new activities that may further improve graduate education at FRIB. Administrative support for the ADE comes from the Laboratory Business Operations Department. One person from that department is assigned to provide support to the ADE as his/her highest priority.

This document describes the mentoring plan for graduate students. It applies to all MSU students whose Ph.D. advisor or co-advisor resides at FRIB. Long-term visiting students whose advisor does not reside at FRIB are invited to participate in and benefit from various elements of the mentoring plan.

2 Onboarding and Initial Mentoring at FRIB

Students who have accepted our graduate school offer are given the opportunity to join the Laboratory in the summer prior to the official start of graduate classes in fall. This provides initial exposure to ongoing research at FRIB and allows the students to identify groups and advisors they might want to work with during graduate school. Students who choose to pursue summer research will receive financial support that is commensurate with first-year Teaching or Research Assistantships, or through dedicated MSU Early Start fellowship funding.

When graduate students join FRIB, they meet with the ADE and the Administrative Assistant to the ADE. The ADE provides advice and support for academic and research activities at FRIB, in coordination with mentoring provided through the department the student is enrolled in. The Administrative Assistant provides coordination for the graduate student's activities at FRIB, including an introduction of the Laboratory, resources available to the student, and a checklist of administrative tasks that must be completed. This introduction is in addition to the information the student receives from the Graduate Student Office of their Academic Department. The students take safety and other pertinent training at the Laboratory when they first arrive, and they can request or be asked to sign up for additional trainings based on their anticipated research work.

Another source of information provided to the incoming students is the FRIB Graduate Student Handbook [5], which is an additional document separate from the Graduate Student Handbooks available from the Academic Departments. It focuses on practical information, lists useful resources, spells out expectations for the student and the advisor, and describes the different types of graduate student appointments. The FRIB Graduate Student Handbook was drafted by the FRIB graduate students with guidance provided by the ADE, to ensure the information is to the point and complete. It is reviewed and updated once per year, typically prior to the arrival of new students early in the summer.

Incoming graduate students meet individually with the ADE to discuss general practices and expectations as well as research opportunities at the Laboratory. The goal is to introduce students to graduate research early and offer them a variety of options. The FRIB Graduate Student Brochure, which is comprised of descriptions of the research programs of each faculty member, is updated yearly and serves as a useful resource. Online versions of the faculty profiles are also posted on the FRIB website [6]. The ADE provides guidance based on the interests of the graduate student. Regardless of whether students already have a strong research preference, they are highly encouraged to talk to a large number of faculty to ensure they receive a good overview of the opportunities prior to making a choice about which research group to join. Students are also encouraged to try out research with a research group for a period and there is no disadvantage to the student if they decide to switch research groups. Although the students are advised to make a definite choice after approximately one year in graduate school, students can change their advisor at later stages.

Graduate students are assigned a desk in one of the student offices by the graduate student representative on the FRIB Office Space Committee. The assignment is coordinated with the ADE and the initial advisor of the student. A computer is set up prior to the arrival of the student and they will receive printed help sheets with important information, in particular a description of resources and contact persons that provide assistance in emergency or non-emergency situations, as well as a sheet generated by the graduate students with useful tips/advice for settling in. Additional useful information, including the documents described above, is available on the FRIB Graduate Student Wiki [7], which is maintained by the graduate students.

The first year of graduate school carries a significant load of course work. Depending on the type

of appointment (Teaching Assistant[1] or Research Assistant/Fellowship), the students may have limited time to perform research, although the summer semester is reserved for research for all students. To support the students, especially during this initial period, FRIB has created a new role for an Academic Specialist for graduate student success and nuclear science in the FRIB Office of Education, Workforce and Career Development (OEWCD). This academic specialist focuses on activities that support students' ability to succeed academically and that foster a climate of community and inclusive excellence.

The academic performance of the graduate students is monitored by the ADE, who communicates with the student and/or the advisor about academic progress.. The ADE serves as an additional point of contact for advice for a wide range of matters, complementing the advisor, the relevant FRIB Department Head and Graduate Program Directors and Coordinators of the student's academic department. The goal of these efforts is to support students' progress through the graduate program and address emerging issues before they become a hindrance to students' progress.

At the beginning of the academic year, a social event to welcome new and current students to the new academic year is organized. Graduate students and faculty at the Laboratory are invited. The goal is to introduce and help integrate new graduate students, and to support community. At this event, the new graduate students make initial acquaintance with faculty so that it is easier to seek contact to discuss research opportunities. An additional opportunity for getting to know FRIB faculty is a newly launched series of "Meet the Professor" events that is aimed at first-year students, but open to all attendants. These events are designed to provide information about a faculty member's research at an accessible level, and to allow faculty and students to share and discuss experiences about their scientific career, as well interests outside of the Laboratory.

The ADE meets with all graduate students as a group once per month, typically during one of the weekly meetings organized by the FRIB Graduate Organization (FRIB GO). During the monthly meeting, updates and information about general affairs at the Laboratory are provided to the students and issues specific to the graduate students are discussed. The ADE also distributes a variety of announcements and opportunities for academic and career advancement to the graduate students by email.

Once a student has identified a tentative supervisor and research group for the initial phase of graduate school, they are asked to meet and fill out a form that defines the shared expectations [8] of both parties, e.g., on time spent working in the Laboratory or remotely, attendance at specific seminars etc. The Shared Expectations form is revisited once per year, until the students form their Ph.D. guidance committee. Copies of this form are submitted to the ADE and the departmental graduate program directors, to assist in monitoring the student-supervisor match. This form can also be submitted to MSU's Graduate School to meet an annual reporting requirement. For students who have formed a committee, the guidance committee forms, available through the Departments, serve the same purpose.

[1] Physics students must teach for at least one semester (although two semesters is common), chemistry students at least two as part of the program requirements. Often this is accomplished in the first year of graduate school, but fellowship students can choose to teach at a later stage.

Near the end of the spring semester, all students submit a report of their academic and research progress to the ADE through a personalized, confidential online form that complements the reports required by the students' Departments and the Graduate School. For instance, this form includes survey questions that allow the ADE to assess the workplace climate among the graduate students, and it allows the students to highlight achievements, awards they have received, etc.

The information provided by the students through the Shared Expectations form, guidance committee forms, and the annual report serves as input for the graduate student reappointment deliberations for the next academic year. Each student receives an appointment letter from the ADE, in which the terms and type of the appointment for the next academic year are described. To ensure that the progress of students is evaluated evenly, all FRIB faculty meet at the end of the spring semester and discuss the progress of all FRIB-based students. The ADE ensures that no protected information is disclosed in this process.

3 Mentoring During the Research Phase of Graduate School

Once the core course work has been completed and the graduate students focus predominantly on their thesis research, the student's advisor, and the members of their Ph.D. guidance committee are the primary sources of mentoring. A guidance committee meeting is held every year, in which the student presents their progress. Copies of the guidance committee forms are submitted to the student's department and the Graduate School, but also to the ADE, who monitors progress and communicates with the student or their advisor if necessary. The committee forms serve as input for yearly reappointment decisions for the students (see above). In addition, students are encouraged to talk to faculty members outside of their guidance committee, or line management.

Students are also encouraged to contact the ADE or seek advice from Department Heads and other faculty members or senior graduate students about any matters related to the work environment at FRIB, and on issues that affect their ability to focus on their research and course work. In addition, MSU has a wide variety of resources available to make it easier to balance graduate school and life, and with support from FRIB's HR Department, the ADE can help seek resources or discuss ways that the Laboratory can assist managing various personal circumstances flexibly and efficiently.

For matters that affect graduate students more generally, the ADE communicates with the President of the FRIB Graduate Organization (a student elected by the students) [9], directly to all students during the monthly meeting with all graduate students, or by email.

The ability to give good presentations is key to achieving a successful career in research and education. Besides the regular advice provided by the research advisor to the graduate student, additional feedback on the research presentation skills is given during the public first-year literature seminar (for chemistry students) and oral subject exam (for physics students). Feedback forms filled out by the audience serve as input for the grading by the guidance committee. The advisor also uses the forms to discuss ways the student can improve the presentation. The presentations associated with these exams must be broadly announced and given in sufficiently large rooms (seminar or lecture hall) at a time suitable for a large audience to be able to join. The regular research discussion slot (Thursday mornings at 11 am) is the preferred time. The faculty member responsible for scheduling the research discussions requests a list of students who are likely to give their oral exams/first year seminars from the ADE at the start of each semester, so the presentations can be scheduled. In later years, students give short presentations about their

research in the guidance committee meetings[2]. In addition, practice talks for DNP or APS meetings are held publicly, and feedback from the audience is requested. Graduate students are strongly encouraged to give a public research discussion[3] about their research in preparation of their thesis defense and senior students are typically sent to conferences other than the DNP/APS meetings. Students are also encouraged to take the initiative in proposing opportunities to present their research at conferences, schools, or other relevant programs.

3.1 Career Advice and Planning

Career advice is an important element of mentoring and the mentoring plan for graduate students. It is an integral part of the yearly guidance committee meetings, and discussions regarding career planning are documented on the guidance committee form.

Besides the resources available through the MSU Graduate School (see [10] and details below), the FRIB Graduate student mentoring plan contains a special focus on career planning. Graduate students are encouraged to interact informally with regular seminar speakers (often during lunch). Every year, two non-academic speakers are added to the seminar program (out of a total of typically 12-14 speakers) to present a broad view of career opportunities outside the traditional academic track. These speakers are often FRIB (or NSCL) alumni who have been successful in a career outside of academia. Occasional alumni get-togethers or other events, such as job fairs, offer additional interactions for current students (and postdoctoral researchers) with successful alumni from a variety of careers. An internal alumni contact list currently contains the names of over 250 alumni who have offered to be available for students and postdocs for career advice.

Besides these resources and events, graduate students are encouraged to communicate with faculty and staff at the Laboratory and on campus about career opportunities. With such a large and diverse group of faculty, each with significant professional networks and connections, it is rare not to be able to find someone who can provide information about opportunities, or a contact to communicate with.

3.2 Participation in Laboratory Committees and Events

Graduate students at FRIB are encouraged to take initiative and show leadership in areas not directly related to research. The development of advocacy, outreach and organizational skills is important for their careers. The Laboratory and the graduate program greatly benefit from the students' involvement in committees and activities. Committees with student representatives include the office space, electronics, social events, seminar, graduate recruiting, outreach, diversity advisory, and Women and Minorities Lecture Series committees. Graduate Student representatives on these committees are elected by the students.

The Laboratory organizes an annual retreat whose attendance is strictly limited to FRIB graduate students, and which is preferably held at an external location. Similar to an annual faculty retreat, graduate students set goals for the coming year, discuss important issues for our graduate student community, and provide input on mentoring, course curricula, events, etc. A report detailing the

[2] Chemistry students have a second-year oral exam, which includes a presentation as well as a proposal document. Only faculty attend.

[3] Mandatory for chemistry students.

outcomes is shared with the ADE and Laboratory leadership, and the ADE and graduate student leadership coordinate the implementation of action items.

Graduate students play a critical role in outreach activities of FRIB, ranging from serving as tour guides (for which students are financially compensated, and receive specialized training from the FRIB Outreach Coordinator) to voluntary participation in science fairs, open houses etc. The graduate student on the outreach committee is the main point of contact for such activities. In addition, FRIB is very supportive (financially and through support for activities) of student-led initiatives, such as the Women and Minority in the Physics Sciences (WaMPS) organization [11] and the Spartan Chapter of the National Society of Black Physicists.

The graduate students are an integral part of many laboratory social activities, which include the Tuesday morning "coffee and bagels", the Thursday afternoon "ice cream social", summer barbecue and various other receptions for new arrivals and departing colleagues. These activities further foster the interaction among all laboratory employees. The graduation of students is celebrated with a farewell party, to which all laboratory employees are invited.

3.3 MSU Graduate School and Other Resources Available for Mentoring

MSU and the MSU Graduate School offer a wide variety of resources for the mentoring and career development of graduate students [13,14]. The FRIB mentoring plan, combined with departmental graduate handbooks and the FRIB graduate student handbook contain discipline-specific, as well as broader professional development elements. In support of disciplinary mentoring, an assessment tool that helps students create an individual development plan (IDP) is available through AAAS [12]. Graduate students at FRIB are highly encouraged to make use of these resources, and faculty are encouraged to work with students to effectively use them to strengthen the students' disciplinary and professional development.

3.4 Graduate Student Wellness Support

In addition to support for students' academic and career development, FRIB provides resources in support of students' general well-being throughout their efforts at the Laboratory. This support, also available to other FRIB employees, comes through wellness training and work-life balance activities, and through individualized wellness support from wellness coaches who are licensed counselors. One of these wellness coaches is a member of the Office for Education, Workforce, and Career Development, ensuring close integration and coordination between wellness activities and other activities in support of students' success. A monthly wellness coaching meeting supports coordination between Laboratory Management, the Office of for Education, Workforce, and Career Development, and Wellness Coaches, which has, amongst others led to the creation of a thesis writing support group, organized by the Academic Specialist for Graduate Student Success and Nuclear Science.

Included in activities aimed at supporting graduate student wellness are support for financial challenges that students may encounter while in graduate school. Funds are available to support students in financial crisis and these funds are leveraged to obtain additional emergency resources from MSU Colleges and the Graduate School that require matching support.

4 References

References

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