**Statistics Department Doctoral Programs Plan for Diversity and Inclusion**

The goal of this diversity plan is to promote underrepresented minority student (URM) dissertation completion and progression to faculty roles. The diversity plan identifies and institutes change strategies within the Department that will improve the climate, practices, and policies so they positively impact underrepresented minority graduate students and faculty in the program.

**Assessment of any obstacles for URM doctoral students in the program and any elements of the program that enhance the success of URM students**

The department head and director of graduate programs in Statistics have created and maintained an informal support network of faculty and staff for students. The department receptionist interacts regularly with graduate students and is often the first to know if a student is struggling and puts them in contact with faculty students or staff. For example, if a student is struggling and feeling isolated, this team of administrators may find study partners for the student. The department seems dedicated to monitoring all of its graduate students and places special emphasis on underrepresented groups. There is some belief in the department that such informal (organic) processes better serve the students as the help comes in the form of caring and invested faculty rather than through (seemingly) less personal and official channels. There is also some concern that official support programs/policies in the department might carry a stigma for the students.

Still, informal discussions with underrepresented minority doctoral students have revealed that some students feel that their needs are not being met and that if they are having difficulty, they do not want to let anyone know for fear of being seen as a weak student.

Department records show that the Basic exam is a major hurdle for URM students in the Statistics PhD program.

Anecdotally, URM students who are supported on fellowships for their first years and then research assistantships do better than students who start on teaching assistantships. Students on teaching assistantships do not have the time to participate in workshops and programs that the Graduate School offers, such as Preparing the Professoriate. Doing their research, plus a teaching assistantship, plus participating in graduate school offerings is too much.

It is widely recognized that an inclusive and supportive environment is a critical part of a successful graduate program. An equally important but less widely-recognized aspect of a successful graduate program, especially in the context of training under-represented minority students, is setting expectations. Recent studies on factors driving success in the STEM academic job market revealed gaps between black students and others in whether they felt that the expectations and standards for success in their doctoral programs were appropriate or not (Fisher et al. 2019. Structure and belonging: Pathways to success for underrepresented minority and women PhD students in STEM fields. *PLoS One*, 14(1): e0209279). Mendoza-Denton et al. (2018. Go beyond bias training. *Nature*. 557:299-301) found gaps in the probability of submitting a paper for publication between URM students and non-URM male students in most STEM programs at UC Berkeley, but not in Chemistry. They found that in Chemistry “students experience a highly-structured environment in which they are introduced to research (via lab rotations) at the outset of their studies, their advisors are regularly and systematically queried as to their students’ progress, and expectations surrounding publication of research results are both implicitly and explicitly clear even in the first two years of study.” (Mendoza-Denton et al. 2017. Difference in STEM doctoral publication by ethnicity, gender and academic field at a large public research university. *PLoS One*:<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0174296> ).

**Concrete actions to promote success of underrepresented minority doctoral students in completing the PhD and preparing for faculty careers.**

1. Regular monitoring of the experiences and progress of students in Statistics doctoral programs.
   1. Develop an assessment process that would provide each student and advisor some indication for direction of first year course placement. Have DGP note the level of each admitted student’s preparation based on information in their application (focusing on level of math and statistics preparation) as they enter the doctoral program; the admissions committee could also note any potential weaknesses as applicants are discussed.
   2. Each year all doctoral students will complete an anonymous general climate survey focused on inclusivity as well as advisor and department support.  This portion will be based on the NCSU Campus Climate survey: <https://report.oirp.ncsu.edu/Survey/Climate/2015/Grad/ccs15.grad_.annotated.pdf> and will include a section with questions to assess the efficacy of the changes proposed in this plan. Make it clear up front that demographic information will be protected so that no responses can be traced back to any individual or small group of students.
   3. When a student leaves the program, demographic information and their reasons for leaving and their next step or position will be requested. This information will be collected by an online questionnaire which may be followed by an exit interview by the DGP or department head.
2. Develop materials and interventions to address issues that are uncovered in Section 1.
   1. Communicate expectations to students about what they are expected to know and be able to do. Make these expectations available when the student joins the program.
   2. Create self-contained, self-assessed modules on prerequisite linear algebra and calculus content for incoming students. Modules would start with a test where each question covers a necessary skill. Students who do not meet a predetermined threshold would be directed to materials/resources to help them learn these skills.
      1. Make these available to students after they have committed to the program, in connection with information on expectations. For example, “You’re expected to know double-integration. Want to check you have the necessary prerequisite skills? Check out this assessment.”
      2. Students could also return to these at any time. Have instructors also make them available during the semester.
      3. Consider developing a TA position to assist with developing these materials and provide tutoring.
   3. Provide some support during the semester and not just during the summer; such as a peer group with faculty to provide litmus statistics problems, check problems, faculty going over problems mid-semester to advise on possible remedial action, and concrete explicit feedback about any gaps the student may have.
   4. Hold a virtual workshop in early fall for students considering applying to our department’s doctoral program on the topic of applying for a fellowship and strongly encourage URM students to participate.
3. Identify and address gaps in expectations for program timelines and research productivity and impart expectations for faculty mentoring.
   1. As a supplement to the doctoral students’ annual progress report, all doctoral students complete an assessment of skills, interests, values, and career goals similar to the assessments in an individual development plan (IDP) to help prepare for long term goals and update it annually. These reports will be reviewed by the advisor and discussed with the student. We can use the IDP template to formulate questions: <https://grad.ncsu.edu/wp-content/uploads/2018/02/NCSU-IDP-Template.pdf>
   2. Training for graduate academic advisors on culturally responsive mentoring and current research about mentoring; providing information and resources for mentoring best practices and mentoring across cultures.
   3. Expand the graduate program handbook to include information about research and thesis timeline and mentoring expectations. The new material will (1) show some example trajectories for different types of dissertation research including a rough sketch showing how the written prelim, oral prelim and final defense should be spaced out and what components are included in a dissertation, and a link to the library of dissertations in Statistics; and (2) clearly state expectations of mentees (e.g., responsibility of mutual communications, graduated responsibility for the direction of research).

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|  | Day 0: Passing qualifying exam | Written prelim | Oral prelim | Final defense |
| Timeline |  | <18 months (restrict) | <26 months (recommended) | >4 months after passing oral prelim (graduate school requirement) |
| Example 1: dissertation consists of papers | Start looking for dissertation advisor | An extended review paper on a given topic | Complete Paper 1; Paper 2 is in progress with 50%~100% completed; and a future topic has been determined for Paper 3. | Complete all three papers. The papers are highly encouraged to be submitted to peer-refereed journals. |
| Examples from faculty |  |  |  |  |

* 1. (The DGP) holds a meeting with all students when they start the program and before they take the qualifying exam, providing expectations about processes and timeline for selecting a research advisor, writing papers, and completing thesis chapters. We want to empower the students, make them proud to be here and excited about the challenge.

1. Combat isolation, worries that URM students might have about confiding in faculty advisors and create community among URM graduate students and alumni in Statistics.
   1. Create a Minority Alumni Mentorship Program that will connect students with Statistics program alumni from the time they are accepted into the program onward, incorporating the following elements. (a) When URM students are accepted into the Statistics doctoral program, include an offer to connect them with a URM alumnus to share experiences about what to expect in graduate school and answer questions the applicant may have; (b) Post-admittance assignment of URM alumni mentor to student mentee; (c) Quarterly engagement of mentor with students via email or text; (d) Annual on-campus dinner or outing for alumni mentors who live within driving distance and student mentees sponsored by the Department.
   2. Enlist a group of "peer" institutions to develop a joint program wherein all of our URM PhD (and masters too maybe) students meet periodically (weekly or biweekly) in order to provide a larger URM community experience than those students can find within their respective departments.   In addition to meeting and sharing experiences, more organized activities such as presenting short talks on research would be possible.
   3. Match Math Alliance Mentors with URM graduate students so that students have an additional faculty mentor who is not their dissertation or academic advisor.

**Sustaining and institutionalizing the action plan**

* The department faculty will formally adopt the Statistics Department Doctoral Programs Diversity and Inclusion Plan so that the activities in the Concrete Actions section will be incorporated into the department’s processes.
* The Statistics Department will create a departmental diversity committee and a departmental climate committee. These committees will be composed of a wide range of faculty and staff. They will appoint undergraduate and graduate student representatives to meet with at least once per semester. The diversity and climate committees will be charged with discussing a wide array of issues related to diversity and inclusion. These issues might include faculty diversity and recruiting/hiring underrepresented faculty, diversity among the graduate students, both masters and PhD, diversity among the undergraduate students, mentoring, and ways diversity can be highlighted in the Statistics curriculum.  The committees will report out and initiate discussion regularly at faculty meetings or on some regular schedule via email.
* The Department will also recognize faculty efforts to promote diversity and inclusion by adding language about activities and achievements related to creating a diverse and inclusive classroom and departmental environment in the annual Faculty Activity Report, Plan of Work and Statement of Faculty Responsibilities.