PhD Program Plan for AGEP-NC

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A primary goal of AGEP-NC (Alliances for Graduate Education and the Professoriate, North Carolina) is to change departmental culture to support URM (Underrepresented Minority) PhD students and faculty in STEM fields and encourage the former to go into academic careers. Participating institutions in AGEP-NC are NCSU, UNC Charlotte, and NC A&T.

The following proposal is a concrete plan for sustainable changes toward that goal. In practice any plan achieving this goal will promote the success of *all students* in the program. An earlier plan presented to the AGEP-NC leadership team in 2023 – see the document and the overview slides – is based on an NSF Innovations in Graduate Education proposal. That plan is far too ambitious to be implemented without funding and major faculty effort. The current proposal is more realistic. Its elements can easily be phased in over the next several years; many can be implemented by Fall 2025. The AGEP-NC website has examples of departmental plans. Here, for example, is a sample plan developed by the MAE department.

An overarching goal of this plan is that all PhD students have successfully established a relationship with an advisor and engaged in a research project by the end of their second year, *ideally by the end of their first year*. This goal needs to be clearly advertised to the students. In particular, the statement on the website

“Core course requirements must be met during the first 27 credit hours of the candidate's degree program.”

should be replaced with

“It is recommended that a student identify an advisor and engage in research by the end of their first year in the program; and that they pass the written prelim and complete the core course requirements by the end of the second year.”

CSC 801

Under Rudra Dutta’s leadership CSC 801, Introduction to PhD Research, was a successful entry point for PhD students, guiding them through a variety of aspects of

the PhD journey – how to do research, finding an advisor, ethics, and more. However, without a well-defined syllabus, infrastructure, and participation by other faculty, the current format is not sustainable. More notes on the basic format of CSC 801 follow at the end of this section.

In Fall 2024 Matt Stallmann added a six-week research experience: the only expectation of a faculty host was to interact, or have their student(s) interact, in a meaningful way with their guest(s) each week; the only expectation of each student was to produce a weekly report of their activities. Based on surveys at the end of the semester, almost all students reported positive experiences; reactions of the faculty were mixed. This is not surprising, given the fact that students were assigned to faculty whose interests did not necessarily align with theirs – the prospect of recruiting a guest student was unlikely (although it did happen in a few cases).

Proposal for CSC 801

Goal: To formalize CSC 801 to the extent that it can be taken over by any member of the graduate faculty and to use CSC 801 to help students successfully find an advisor. Equally important is to make faculty aware of opportunities to participate.

Components of the plan related to CSC 801 are the following.

1. Formalize the CSC 801 syllabus and schedule and develop materials for various topics so that it becomes sustainable. Also, make it part of the teaching load for the person coordinating it. Some important topics are:
    a. Overview: what is research
    b. Examples of research projects in several areas
    c. How to read a paper – multiple approaches
    d. How to write a paper
    e. How to give a presentation
    f. Practice with reading, writing, and presentations; due to large class size, it is best to work in small groups to critique each other's contributions
    g. Ethics
    h. Accessibility
    i. Finding an advisor
    j. The advisor/advisee relationship; statements of mutual expectations
    k. Individual development plans
2. Include a 12-week research experience for CSC 801 students with the following features.
    a. Offer mechanisms for matching students with host faculty: a form for expressing preferences, lightning talks, posted projects, etc.
    b. Expect deliverables:

        i. a small project or literature review
        ii. a report and presentation
        iii. weekly progress reports
    c. The 12-week experience will be evaluated after six weeks, and, if it is determined that the relationship is not working out, the student may be allowed to switch hosts (if another host is available).
    d. If a student is already working with an advisor, they may choose to use that work as their 12-week research experience.
3. Make CSC 801 mandatory for all incoming PhD students.

Another potential outcome of CSC 801 is to foster the formation of small, diverse support groups around common non-academic interests. Such groups, formed during informal class activities, will continue to be beneficial throughout the PhD journey.

CSC 801 format in Fall 2024

CSC 801 has been offered in three-hour (minus 15 minutes) sessions on Friday mornings. In Fall 2024 each session was divided into three segments of 45–50 minutes each with 5–10 minute breaks between. Four topics, covered during a full class session (all three segments) were

- What is research?
- Finding an advisor
- Ethics
- Advisor/advisee relationships

Another three *segments* were devoted to panel discussions: more senior PhD students (with no faculty present), tenure-track faculty representing all three ranks and several research areas, and teaching faculty representing three ranks.

Faculty and students signed up for many of the remaining segments (or parts thereof) to give talks about their research or other topics of interest. Three segments at the beginning were devoted to getting to know each other and open discussion on topics of interest (why PhD, why NC State, hopes, fears, etc.). There were twelve empty segments, spent on check-in's, open discussions, and ending class early. The check-in's and open discussions contributed to cohort building, but more structure and guidance would have been useful.

Early in the semester some of the segments were devoted to unstructured discussions with ice-breaker exercises. For the first half of the course, students were assigned seats randomly to encourage them to get to know as many of their classmates as possible.

CSC 890

Challenge to be addressed: The current expectation for passing the written prelim is a conference-quality paper. Some students postpone CSC 890, the written prelim, until late in their career (after the second year), delaying research progress. Many of these students have either struggled to find an advisor or struggled with the process of research and writing. A student who has not found an advisor and begun research is at risk and needs help, either to succeed in the program or to consider other options.

1. Clarify the expectations for passing the written prelim and post examples of past written prelim papers. The paper should be (i) authored primarily by the student; and (ii) of conference quality, as judged by the advisor and area expert on the committee, but not necessarily published or even submitted.
2. Create a one-semester three-credit course with scaffolding to lead students to successful completion of their written prelim. Incorporate milestones, practice presentations, instructions on technical writing, and other general guidance. Call it 889 for now.
3. Once created, CSC 889 may either be offered to students in their fourth semester to help them pass their written prelim by the end of their second year or in their fifth to ensure that they are no more than a semester behind. After the progress of each of several cohorts is monitored, faculty can decide whether to offer CSC 889 regularly in the spring or in the fall or both.
4. Successful completion of CSC 889 would be equivalent to passing the written prelim.

Independent Study

The course catalog description of CSC 830, Independent Study, says simply

> Individual investigation of advanced topics under the direction of member[s] of the graduate faculty.

This allows for flexibility, in particular to deal with two realities: (i) a research project often involves multiple students working with multiple faculty members; and (ii) there are situations where a mismatch between student and faculty member and/or the nature of the project hinders successful completion. We propose two ideas to address these realities. The primary implementation detail is how the decision of a grade (S, U, or IN) is to be determined.

1. The proposal for an independent study submitted at the time of registration may specify multiple faculty supervisors. One faculty member needs to be responsible for the grade, in consultation with the other involved faculty.

2. An independent study may be evaluated after six weeks, and, if it is determined that the project or the relationship is not working out, the student may switch advisors. The second advisor would be responsible for the grade. This "exit ramp" would require additional conditions/safeguards, such as an agreement among all parties involved.

TA Course

Challenge to be addressed: Students who are not doing research with a faculty member at some point in their first year are supported as TA's. These students have to juggle their courses with TA responsibilities, making it more difficult for them to find an advisor. And anecdotal evidence suggests that many first year PhD students are not effective as TA's.

Goals: The goals of a TA course are: (i) relieve the burden of having an extra graded class; (ii) provide instruction on being an effective TA; and (iii) provide a support group for TA's.

Proposal

1. Introduce a two-credit[1] TA training course modeled after Tim MacNeill's course for lab TA's (CSC 293 – see syllabus) – refer to it as CSC 860 for now. Tim MacNeill's course, required of undergraduate lab TA's, combines general TA training with sessions that allow students to share their experiences and receive feedback. While CSC 293 is a one-credit course, it can be augmented to include content related to being an instructor and content related to the large variety of instructional technologies used in the department.
2. Require CSC 860 for all students who are doing a TA in their first semester.

SME's and IDP's

Goal: To improve the likelihood that students will successfully work with their advisors and carry out research.

Several departments at NCSU and other universities have included mandatory statements of mutual expectations (SME's) between advisors and advisees – here is a spreadsheet with links to several of these. Some programs also require individual development plans (IDP's) for students. However, an SME is not a one size fits all document. Each student and each advisor has different expectations and communication styles – see, for example, the MAE grad student survival guide.

[1] Two credits will allow students to have three credits when combined with CSC 600.

1. Formalize advisor/advisee relationships by requiring a student and their advisor to register their intent with the graduate office.
    a. Registration should not occur until after the student has completed at least three research credits with their advisor.
    b. But registration should occur by the end of the third semester.
    c. A change in advisor(s) requires a discussion among all parties involved.
2. Incorporate advisor/advisee relationships, SME's, and IDP's into CSC 801.
3. Require students to have an IDP after they register for independent study and keep it updated for the PhD review process.
4. Strongly encourage both students and advisors to develop SME's and make resources for these easily accessible from the program web page.

Mentoring

Goal: There are many advantages to mentoring beyond advising. A student who is mentored by faculty other than their advisor and by more experienced students has a better chance of succeeding in the program. Such mentoring should be encouraged and supported.

CIMER (Center for the Improvement of Mentored Experiences in Research) training is one of the most used tools for improving relationships between faculty and their advisees. Several faculty and administrators at NCSU have been certified to provide CIMER training. A few faculty in our department have used CIMER materials to develop a mentor training experience. The Provost's office also has resources for mentoring. There are multiple options and formats for the training – for faculty mentoring students, for students being mentored, and for students mentoring other students. The CIMER website outlines these.

1. Require CIMER (or similar) mentor training for faculty within one year after joining the department and within the two years before each promotion and post-tenure review.
2. Include CIMER training in CSC 801 (with emphasis on relating to an advisor) and offer it later in a student's career (with emphasis on mentoring junior students).
3. Assign a student mentor to each incoming student. Students who are willing to be mentors can sign up. This may require incentives for student mentors to participate.
4. Encourage students to have a faculty mentor who is not their advisor. Faculty who are willing to offer their time can sign up and add it as service in their dossiers.

Resources required

A. **Course development**. Three courses are mentioned in the proposal. All three, in addition to development effort, will require faculty to offer them regularly.
    a. CSC 801 already has significant structure and content. The primary task is developing a well-defined syllabus and schedule.
    b. CSC 889 for the written prelim will require careful design and some critical decisions: How will it be coordinated? To what extent are the advisors involved? What will the content be (other than what the students and advisors contribute)?
    c. CSC 860, the TA course, can be adapted from Tim MacNeill's class, but needs additional content and willing instructors.

B. **Commitment from faculty.** Several parts of the proposal require commitment of time by faculty and efforts to recruit and incentivize faculty.
    a. CSC 801 functions best if guest speakers address topics that align with their interests and experience.
    b. The research experience in CSC 801 will require faculty to spend time with students who may not end up working with them. The hope is that an effective matching "algorithm" makes it more likely that a student assigned to a faculty member will work with them.
    c. Oversight may be required to ensure that deliverables for the research experience are produced.
    d. Some faculty need to be willing to mentor students who are not their advisees.
    e. The mentor training requirement is a time commitment – usually a significant part of a day.

C. **Other**
    a. Gathering and analyzing quantitative and qualitative data to assess the success of each part of the proposal is essential and requires effort on the part of graduate office staff and/or a dedicated faculty member.
    b. Advanced students may require significant incentives for mentoring incoming students, and be convinced of the benefits of doing so.
    c. Requiring CSC 801 for all incoming students would mean increased enrollment.
    d. A mechanism for formalizing the advisor/advisee relationship needs to be created.
    e. A mechanism to incorporate IDP's into the PhD review process needs to be created.