

Carnegie Initiative on the Doctorate Report (March 21, 2006)

Department of Mathematics

University of Nebraska-Lincoln

Following is a list of changes in our Ph.D. program that have been initiated since the Department's involvement with the CID. The Department became a Partner in the CID in 2003. In the same year we received a Graduate Assistance in Areas of National Need (GAANN) grant from the Department of Education. In 2004 we received a Mentoring through Critical Transition Points (MCTP) award from the National Science Foundation. Thus some of the initiatives we will describe here are actually part of one or the other of these federally funded initiatives. All of the programs below are available to all Ph.D. students, whether or not they are supported by GAANN or MCTP.

1. Initiatives for First-Year Graduate Students.

a. Qualifier Exam Workshop. Each May, the Department offers four two-week sessions, one in each of the core areas - algebra, analysis, applied mathematics, topology. The workshops are run by advanced graduate students and benefit students who are preparing for the June qualifier exams. By having graduate students develop and run the workshops, we separate the faculty responsibility of creating and grading exams from the responsibility of advising graduate students as they study for the exams. As bonus, the workshop provides advanced graduate students with an opportunity to mentor younger graduate students. The most significant benefit of the workshop is that more students choose to take the exams at the end of their first year of study. Since the inception of this initiative, there has been a marked increase in the number of students qualifying at the end of their first year. (Part of the increase, however, can be attributed to the overall quality of students we have been able to recruit to our program in recent years.)

b. Mathematical Landscapes Seminar. This one-credit seminar is required of all first-year Ph.D. students and meets during the Fall Semester. The seminar introduces students to the range of mathematical research done in the Department and provides a perspective on how different areas of mathematics fit together. Talks are given by faculty and postdocs in the Department.

c. Introduction to Teaching Seminar. This seminar for first-year Ph.D. students meets once a week during the Spring Semester. Presentations include such issues as preparing a syllabus, preparing a lecture, grading, facilitating group work, and dealing with academic dishonesty. There are hands-on sessions in which participants prepare and give practice "mini-lectures", which are videotaped and analyzed. [This seminar has evolved with experience. It is now called the Teaching Mathematics Seminar and includes GAANN Fellows and other graduate students, not just MCTP fellows, teaching their first course. Since this first course is often in the fall, the seminar is now offered in the fall.]

d. Peer and Faculty Mentoring. Each entering graduate student is assigned a Peer Mentor and a Faculty Mentor. The Peer Mentor and the Faculty Mentor share the responsibility of helping new graduate students adjust to their new surroundings, counseling them on time-management, and advising them on their coursework and teaching responsibilities. Once a student chooses a Ph.D. advisor, that person will assume the role of Faculty Mentor.

2. Initiatives for Advanced Graduate Students.

a. Professional Development Seminar. The goal of this seminar is to give participants the best possible preparation for the issues they will face as tenure-track faculty members at four-year colleges and/or as postdoctoral scholars at Ph.D.-granting institutions. The seminar is run by Department faculty, with several sessions offered by the Coordinator of Graduate Student Training and Development for the UNL Graduate College. Topics include writing grant proposals, navigating service commitments, strategies for teaching

courses outside one's area of expertise, tips for incorporating active learning in courses, and time management. Participants seeking employment in Ph.D.-granting institutions receive advice and assistance in preparing applications for NSF Postdoctoral Research Fellowships.

b. Academic Job Search Workshop. This workshop is for students expecting to receive their Ph.D. within the year. During the Fall Semester, participants work together in sorting through job announcements and writing CV's, cover letters, research statements, and teaching statements. Participants prepare interview talks and present them to each other. Follow-up mentoring is given in the Spring Semester, as students receive guidance on negotiating job offers and are encouraged to apply for programs such as Project NExT.

c. Mentored Teaching Experience. This initiative is required of all GAANN Fellows and is available to all interested graduate students. Students work closely with their faculty mentors, who provide feedback on all aspects of participants' teaching. Each participant's class is videotaped by the Coordinator of Graduate Student Training and Development for the UNL Graduate College. The Coordinator and the participant meet later to go over the videotape and, where needed, to discuss strategies for improvement.

3. Programmatic Changes.

a. Joint Ph.D. in Mathematics and Computer Science. The Graduate Advisory Committees of both departments worked together to draft rules regarding qualifier exams, comprehensive exams and the dissertation. Subsequently the proposed rules were ratified by the Graduate Faculty of both departments. Financial support for students in the program is negotiated on an individual basis.

b. Changes in the Qualifier Exam. In order to accommodate students with a strong interdisciplinary component, students are no longer required to take the Ph.D. qualifier exam in both algebra and analysis. Instead, they must choose at least one of these among the three required exams. Ph.D. students are still required to take the introductory graduate courses in both algebra and analysis. (Well prepared students, and students transferring from other graduate programs, often start with the second-year courses in one or both of these disciplines, and of course the requirement is waived for such students.)

4. Work in Progress.

a. Joint Ph.D. Program with Biological Sciences. The Department hopes to use the joint Ph.D. program with Computer Science as a model in order to establish a similar program with the School of Biological Sciences.

b. First-Year Research Experience. Many of our incoming students have had significant undergraduate research experiences. Some of these students are put off by the relentless coursework that characterizes the first two years of graduate study at UNL. It has been suggested that one of the core courses that form the foundation of the first year of study be replaced with a research experience. Many details still need to be worked out, for example, effect on the participating student's overall graduate program, impact on the qualifying exam structure, and allocation of faculty resources.

c. Advising Manual. On the recommendation of the Department CID Committee, the Chair has agreed to provide funding during Summer 2006 for two advanced graduate students to produce an advising manual for graduate students. The manual will cover such issues as when certain forms need to be filled out, whom to go to for various kinds of help, reasonable expectations of advisor and advisee, what constitutes satisfactory/exemplary academic progress, and so on. The Graduate Advisory Committee and the Graduate Student Advisory Board will provide input for this project.

d. Jump Start for Peer Mentoring. Various schemes were suggested to increase interaction between new students and their peer mentors. One scheme proposed by the CID Committee was to have a group of advanced graduate students, part of whose assignment would be to serve as a mentoring committee. The Graduate Student Advisory Board discussed this plan and decided the current one-on-one system was

preferable. The only change we plan to make is to have a kick-off event of some sort - possibly a picnic - early each Fall Semester as sort of an ice-breaker, in order to jump start the peer mentoring process.