

In Defense of the Department of Mathematics

Mathematics Graduate Students

January 27, 2024

Chancellor Gilliam:

The recent proposal to cut the Computational Mathematics PhD program and the MA program is not only unjustified on the publicly made grounds of administrative decision making regarding APR, it is an attack on core values of the mission of this University.

A university is an institution designed to preserve, transmit, and create knowledge. It is a rare social institution in which space is created for human action animated towards the pursuits of truth, beauty, and justice.

It is also an undisputed truth that the success of industry – in computing technology, transport, manufacturing, chemistry, machine learning and so on, is inexorably dependent on the advancement of mathematical knowledge. Much of this knowledge, in turn, is transmitted throughout our high-technology civilization through the work of mathematicians as teachers and scholars. That fact remains true as we write.

The mathematical sciences are intertwined with almost every other discipline - from arts to biological sciences. STEM is synonymous with innovation, which goes hand-in-hand with societal development. A decision to shut down STEM programs, especially those in the Mathematics and Statistics Department, is going to have a long-standing negative impact on the university's reputation as a body of higher education.

Additionally, it affects any students coming to our program for the purpose of social mobility. A student who was living paycheck-to-paycheck before this program can start a career earning a minimum of \$80,000 in high tech industry. This program also has a benefit to undergraduates through the Accelerated Master's program, which gives students this social mobility while retaining students at the university.

Graduate students are therefore crucial for the advancement of mathematical knowledge and the spread of mathematical understanding in science, industry and technology. Many of us have had stellar evaluations from our students and have had high student success. And this, Chancellor Gilliam, is no small feat. Recall what Euclid said: There is No Royal Road to Geometry. Knowledge in mathematics is difficult to attain. Tusi's work on polynomials in 1165AD didn't see its most ubiquitous applications until the rise of scientific computing and numerical analysis. It is an absolute miracle that we are able to transmit in a semester knowledge that took our species thousands of years to accumulate. And that is not hyperbole. Our students have to work hard. And we work hard for our students.

As Graduate Teaching students, not only are we part of the ‘teacher-scholar’ model Provost Storrs lauds in her own personal statement - and thus intrinsically important for this administration’s publicly stated vision - we are also an integral part of making learning an inclusive experience for the incredibly diverse student body that we love.

For example, in MAT 112, one of our students was a 70-year old retiree passionate about pursuing a literature degree. Halfway through the semester this person needed to get radiation treatments. So, the graduate student in charge of this class made sure they could participate from home entirely by zooming and turning assignments in online, as well as checking in regularly with them.

In STA 108 a graduate teaching assistant had a student who was blind and collaborated with UNCG’s accessibility staff and Macmillian (the textbook company) to ensure all course materials had sufficient alt text for screen reading as well as voice recordings and additional assistance from note takers.

Many graduate students came to this program with a diverse teaching experience. We are teachers who decided to further our own education in mathematics so we have a deeper understanding to offer our future students. Some of us have a masters in education, experience in teaching at private colleges, community colleges, and are even trained and experienced Montessori school teachers. Collectively, we have experience teaching at every single educational level - from pre-school to graduate level mathematics.

We leverage this collective knowledge by teaching our courses in collaboration. We all bring our ideas, experiences and talents in developing the courses. And our students are supported in their academic and individual aspects of their experience. We all take pride in teaching our courses and also in doing research as part of this teacher-scholar model.

With this in mind, it should not be surprising that many authors of this letter have had students tell us we are some of their favorite teachers. In fact in one graduate class last semester, a student came into the classroom to personally thank one of the graduate students for helping her with her calculus homework at the tutoring center. She was so happy when her understanding finally clicked, and being aware that this was something difficult to attain, felt such an overwhelming sense of gratitude that she just had to risk interrupting a class to exclaim about her excitement. This is what a community of learning is all about.

One could multiply examples endlessly. We graduate students, therefore, play a crucial role in student success, the advancement of mathematical knowledge, the pursuit of truth, and as this student experienced – transmitting a sense of joy in the simple beauty of understanding.

The core tool of the mathematician is mathematical proof. The mathematics department is therefore unique among all of the departments in this regard: we have the highest epistemological standards for the accumulation of our knowledge. Science and technology are grounded in the certainty of mathematical knowledge. As Graduate Students, we are trained to prove theorems upon which many of the models of science and technology rest. Not only then are we qualified as a community to teach as teachers – many of us having years of experience – but we can also prove what we know, and we understand our subject very deeply. There is no other subject quite like this. It is one of the unique joys of the pursuit of mathematical understanding itself.

Mathematics is the logical shadow of reality, and the heart and soul of science and technology. Philosophers will no doubt be arguing for centuries about its ontological status. But its epistemological centrality for a dynamic and efflorescent scholarly community is beyond doubt. And we want to be clear: none of this is to make a value judgement on different forms of knowledge at this university. It is simply to point out the fact that all forms of knowledge benefit from a deeper understanding of subtle forms of reasoning about patterns and structure. It is in this sense that a robust mathematics program is indispensable for higher education.

Terminating these programs will not only hurt UNCG in the long run, damaging the reputation of the entire community, but is also unprofitable. Mathematics is interwoven throughout both science and industry, and eliminating our PhD program in Computational Mathematics, as well as the MA runs counter to the stated goals of this university. As Provost Storrs herself says on her website:

“The teacher-scholar model embraced by faculty at UNCG fully integrates with student success and encompasses the UNCG educational mission. The model combines a passion for scholarship and discovery with a strong commitment to teaching excellence. At UNCG, many of our faculty engage in community-engaged scholarship, researching local problems and engaging students and the community during the discovery process. Many of our faculty are engaged in externally funded research and creative activity, as they explore and research questions of importance to the region, nation, and world. Faculty scholarship and creative activities inform our students, contribute to our society, and transform our experience and understanding of the world. The hallmark of the teacher-scholar model is that it engages students directly in their own learning and infuses learning with discovery. It’s what we do at UNCG.”

It is certainly what we are doing at UNCG and what we want to continue doing at UNCG. We are passionate about mathematics, teaching, and scholarship more broadly. A Graduate student is by definition a teacher-scholar. Therefore, we urge you to reject the most recent proposal. Cutting our PhD program in Computational Mathematics and our MA program is a completely unsound decision.