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Dr. Janet Verbyla
Dean of Sciences
University of Southern Queensland
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Dear Dr. Verbyla,

I was recently informed of some decisions at the University of Southern Queensland regarding changes to the Mathematics and Computing, and Statistics Departments that concern me. While I am no longer living in Australia, I am very much concerned about academic life, and mathematics in particular, in Australia. My situation is hardly unique as an ex-patriate Australian mathematician. I know quite a few others, which speaks to a long-term problem Australia has in keeping its best and brightest. Which makes the recent decisions at USQ hard for me to understand.

The decisions to reduce the academic staff at the Mathematics and Computing, and Statistics Departments by roughly half, eliminate all graduate education and indeed the undergraduate majors of these Departments truly guts these Departments. It is hard to view this as a necessary restructuring, but rather a body-blow at the very things that lie at the foundations of a technical education. I understand that USQ is re-positioning itself with the introduction of a BTech to replace the BSc, but I am concerned that the education provided by this "BTech" will prove much lower in standard than anyone wants.

Part of my reasons for this are that I strongly believe that mathematics, statistics and computing lie are foundational subjects, and that without these, we cannot easily understand how the modern world operates. It is tempting to say that "No-one these days really needs to know mathematics". This is a common mis-understanding, and a dangerous one. Why is it dangerous? Because so much of the modern world relies on mathematics — we use it every day without knowing it. We use mathematics either through the things we use that have software embedded in them or use software that is based on mathematics, or is something designed using software, again based on mathematics. For example, if you use Google to search the Internet (as most of us do), then you are using the results of a very large-scale eigenvalue/eigenvector problem: $A\mathbf{x} = \lambda\mathbf{x}$ where A is a square matrix representing connections between web pages, $\mathbf{x}$ is a very large vector (the eigenvector) and λ is a number (the eigenvector). The mathematical theory and computational knowledge that go into it, are not readily apparent to the naive user, but they are there. These are not perfect tools, and knowledge of how they operate indicates how they behave as desired, as well as what weaknesses they have. Another example: GPS. This relies on getting accurate time signals from at least three satellites, along with some spherical trigonometry and numerical computations, to tell you where you are. Our factories are full of control systems that we hope are stable: understanding these requires understanding differential equations and dynamics. The failure of electricity grids in the USA in the past few years show that we still have some way to go before we can truly say that we well understand the dynamics of large, complex networks.

Technology is changing so rapidly, that knowledge founded on particular examples or even particular systems, will rapidly become redundant. The true basis of a technical education now, I believe, should be founded on more basic principles. Your graduates will be competing with everyone around who can use a browser and Google, Yahoo!, or any other search engine. The advantage will go to those who can make use of the (rapidly changing) knowledge out there; this will be those who know the fundamentals, and can pick from the technology available the ideas and systems that properly handle the fundamental issues. Since this technology is founded on mathematics, a deep rather than shallow knowledge of mathematics is vital. Reliance on technology to "do the math" for us does not lead to a deeper understanding of mathematics, but a more shallow understanding. This is an issue in secondary mathematics education here in the US, as reliance on calculators has produced students with a worse understanding of (say) algebra rather than a better understanding.

I have been very impressed with the quality of the Department that Tony Roberts has been able to build at USQ. I have seen it as an example of a small Australian university that has built a quality program with plenty of outreach to other scientists, and dealing with issues relevant to the community there. But with decisions to remove about half the faculty, the graduate program, and the major, it is hard to see how this quality can be maintained. The two main things that makes mathematicians enthusiastic about their work are the opportunity to push back the frontiers of knowledge, and to see students learning and understanding. With only service teaching, there will be few opportunities to add to mathematical knowledge, and the students will be quickly on their way to other courses with little time to add to their understanding of mathematics. USQ is lucky to have such a wonderful reserve of teaching talent. However, without these reasons to stay, even the faculty who are not cut will be looking for other opportunities. Even after the inevitable morale problems of cutting a department are forgotten, the only faculty remaining in five years or so, will be those that simply cannot move, or view working there as simply a job to do.

I am very concerned that these decisions will make USQ a much worse place, beginning a downward spiral in quality that will make the BTech appear like an unfortunate degree to have. (Why not get a Diploma?)

As a member of the Australian academic diaspora, it saddens me to see this kind of thing happen. But I am not there. I do not have the kind of purse-strings to open and make short-term resource issues go away. I believe these decisions are mistaken, and will cause more long-term harm than can justify the short-term gains (let alone the short- and medium-term pain).

I wish USQ success, but this is not the road to travel.

Yours sincerely,

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cc: Prof. Graham Baker, Prof. Bill Lovegrove, Prof. Rod St. Hill, Prof. Tony Roberts, Prof. Terrence Tao.