November 2010

EXECUTIVE SUMMARY

1. Doctoral graduates in the mathematical sciences are vital to maintain the UK's world class research base and for their wider contribution to the UK economy. Between 400 and 450 doctorates are awarded in the mathematical sciences in the UK each year; this number needs to be raised to 500 to maintain the academic community and meet the UK's demand beyond academia. To complete the pathway, 100 postdoctoral positions are needed each year by the mathematical sciences community.

2. A first class degree (or equivalent) should normally be expected for admission to a PhD. We would also expect a large proportion of students to have moved institution since their undergraduate degree and the quality of the locally-trained and migrant students to be the same.

3. The Research Councils' approach to funding doctoral training in mathematical sciences is broadly appropriate.

- The level of the Doctoral Training Account should not be eroded in favour of further Doctoral Training Centres
- Peer review is vital in deciding Doctoral Training Grant allocations for mathematics
- We fully endorse the decision of EPSRC to report the allocation to mathematical sciences in the Doctoral Training Account as a separate line.

4. The breadth and depth of PhD training everywhere in the UK must compare favourably to that available at peer institutions in the other leading mathematical nations.

- Mathematical sciences students should have eight years of study[1] from the beginning of their undergraduate career to the end of their doctorate
- Doctoral students must have secured funding for four years
- All PhD students should have access to a wide range of taught courses using real or virtual trans-institutional communities where necessary.

5. Every UK PhD thesis in mathematics should contain publishable original work to compete internationally. Students should also demonstrate genuine fluency in their area of research, the ability to do original work and an appreciation of the important ideas across a wider range of mathematics.

6. Doctoral students should be distributed widely across the UK. At the same time:

- All PhD students should be embedded in a community of peers that has sufficient mass to stimulate and maintain a culture of solidarity and excitement within each field and across mathematics
- Stable mechanisms must be developed in order to foster and maintain such communities
- The entry-standard of PhD students and the level of achievement demandedt dn eh l emm

Doctoral Training in Mathematics in the UK

1 Core criteria

Doctoral graduates in mathematical sciences are the life-blood of the UK's world class research base and vital for their wider contribution to the UK economy. To maintain this, UK doctoral training in mathematics must ful l two key criteria:

1.

3 Intake

According to HESA data from 2007/8, about half of students registered for a research degree in

but this is by no means universal. The 2008 National Student Forum commented in its annual

We would hope that the number of UK students choosing to pursue doctorates overseas would be mirrored by a similar number of talented overseas students coming to the UK. The loss of the ORSAS scheme has dealt a serious blow to this aspiration.

Summary

There are three natural models for the distribution of funding for doctoral research. Money can be allocated to the student, the potential supervisor or the institution. Current arrangements place an emphasis on the second and third, perhaps for practical reasons.

> Recommendations: *We believe that an approach to funding based on a blend of the above three models such as that currently used by the research councils, is appropriate for the mathematical sciences. We do not wish to see the level of the DTA eroded in favour*

> Major funders of postgraduate researchers should make all funding conditional on post-graduate researchers' training meeting stringent minimum standards... This should include the provision of at least two weeks' dedicated training a year, principally in transferable skills.

Research councils currently provide about $22 million per year of `Roberts skills money' towards the cost of two weeks dedicated training for each student each year. Roberts funds have been con rmed until the 2010/11 academic year, but then cease in the current form. All universities o er

feel that concentration of students in a small number of centres can go further without seriously damaging the health of the subject in some geographical regions.

Recommendations: *All PhD students should be embedded in a community of peers that has su cient mass to stimulate and maintain a culture of solidarity and excitement within each eld and across mathematics. Stable mechanisms must be developed in*

around 500 PhDs in the year in order to maintain the steady state. Of course, some of those academic posts will be lled by individuals with PhDs from overseas, but, assuming that the UK PhD is competitive, we would expect similar numbers of UK PhDs to be taking academic positions overseas. In most subjects, lecturers are not appointed directly from their PhD. Allowing for some attrition at the postdoctoral level, we note that the calculation above suggests that we also need of the order of 100 postdoctoral positions starting each year.

Recommendations: *In order to provide a su cient number of suitably trained people*