centre for excellence
sigma Σ
in mathematics & statistics support

Mathematics/Statistics Resources Centre at the University of Bath

Drop-in mathematics support has been offered within the Department of Mathematical Sciences for 5 years. The provision is for six hours per week, for first year mathematics undergraduates only and is provided by one academic staff member together with a team of peer tutors.
We now have an opportunity to develop mathematics/statistics support and peer tutoring for all students at the University of Bath by working with the national CETL for mathematics/statistics support. The CETL, named ***sigma***, is based at the Universities of Lougborough and Coventry
Dr. Jane White (kajw@maths.bath.ac.uk) will head the centre for which we have secured two years of funding (see Section 5 below).

The mathematics resources centre will operate from the Department of Mathematical Sciences but will be available to all students in the University of Bath. It will receive full support from the University and will form one component of the central academic support system for students within the university. The physical centre which will be used for all core activity can seat 25 students. Larger rooms with capacity up to 40 may be used for revision sessions.
The centre will operate a variety of approaches to support student learning and will employ a teaching fellow, academic staff tutors and peer tutors. The peer tutors will undergo a training programme run jointly by the Department of Mathematical Sciences and the Students Union SORTED training programme.

1 Core support activities

We wish to offer a range of activities in the resources centre. The list of activities for the first two years is as follows:

Drop-in sessions: these will offer help to individuals and peer groups and will provide guidance on the resource available to assist learning across a wide range of mathematical and statistical topics. There will be 3 components to this provision:

1. Continuation of the current provision within the Department of Mathematical Sciences for first year mathematics undergraduates (***6 hours/week***)
2. Mathematical and statistical support for all other undergraduates (***6 hours/week***).
3. In 2008/09, we will extend provision to the Department of Mathematical Sciences to include support of second year undergraduates (***2 hours/week***).

The sessions will be staffed by trained peer tutors, the teaching fellow and Jane White.

Workshops and revision sessions: these will provide teaching and learning opportunities in selected mathematical and statistical topics. In the first instance, the choice of topics will be guided by requests from academic departments and students and we will operate a signing up procedure (first come first served). We anticipate that our experience in running the centre will also help guide choices in future years and may also encourage us to consider running sessions for targeted students rather than individuals on a self-referral basis. These sessions will be offered to all undergraduates and will be led by the teaching fellow and invited academic staff. We will offer sessions ***up to 16 hours per semester***. In 2008/09, we will extend workshop provision to postgraduate students at the University of Bath who need support in statistical techniques for data analysis.

Timings of the drop-in sessions, classes and workshops will vary on a semester basis to ensure accessibility of provision to all students. We will pilot twilight hours drop-in support and access to the resources centre throughout the first year – we anticipate that this could be popular given that Bath is a campus university and that many undergraduate programmes have heavy timetables during office hours. We will also carry out a feasibility study on weekend provision in year 1 and will act on the outcomes of this study in year 2. In this case, we anticipate that we may offer some weekend workshops and offer limited drop-in provision during the weekends.

Library clinic: this will be provided by the subject librarian for mathematics and statistics. The clinic will be used to provide guidance on referencing, data bases and accessing resources, both locally and online, for mathematics and statistics support. The subject librarian has an interest in reflective journals as a learning tool

and we will promote this approach to supported self study and self assessment using her expertise. The library clinic will operate from the resources centre for ***one hour per week*** during the semester.

Access to resources centre: During times where the resources centre is open but not offering drop in provision (***up to 10 hours/week***), it will typically be staffed by one person. This staff member will be able to provide guidance on resources and limited technical support. Access will be publicised to all students at the University of Bath.

Online resources and support: The web site for the centre will link to sigma and mathcentre and will cross reference resources to different programmes of study as well as different topic areas. We will offer a range of discussion forums, monitored by the teaching fellow, quizzes for self-assessment linked to relevant support materials, and opportunities to use reflective journals as a learning tool. We will use the VLE Moodle, for which there is central support in the university. We will link to other mathematics websites, such as that of MIT. We will encourage departments to provide us with any online materials which they produce to support their mathematics/statistics teaching so that students can access all relevant materials directly from the website for the centre.

Curriculum development across disciplines: Several departments within the university are reviewing and extending their undergraduate mathematics provision. One such department, Biology and Biochemistry, is hoping to increase participation in a final year unit on mathematical modelling for biologists which has a pre-requisite of A level mathematics (a qualification which only around 35% of the biology cohort currently have). One possibility would be to offer free standing mathematics units to students in years 1 and 2 which would allow students to develop their mathematical skills to A level standard. The centre will work with colleagues in the department of Biology and Biochemistry to determine the viability of such an approach with the view to offer such provision from 2008/09.

1.1 ***Peer tutoring programme*** A programme of training for peer tutors is being piloted this year at the University of Bath, run jointly by the Department of Mathematical Sciences and the Students Union SORTED skills training programme. The programme consists of five core sessions delivered as workshops over two semesters and each supported by web-based material presented via a Moodle module. The sessions are:

- *How students' learn*, an opportunity to consider different learning styles and reflect on the impact of this in terms of tutoring mathematics and statistics.
- *Running an effective tutorial* Includes discussion of preparation, use of tutorial time, student involvement etc.
- *Observation of a tutorial*
- *Having a go!* A mini-tutorial presentation given to peers on the training programme and videoed for reflection after the presentation.
- *Effective assessment and feedback* Discussions of the impact on learning of different feedback mechanisms and opportunities to explore how assessment procedures can guide student learning.

In this pilot year, we already have students interested in tutoring in the departmental maths resources centre. We will enhance the programme for tutors in the new mathematics resources centre to include more discussion of student support and resource based learning and will extend provision to students across the university (many departments have already expressed interest in being involved in this programme in the coming academic year).

1.2 ***Use of technology*** Online resources will form an integral part of the maths/stats support offered within the centre and will make use of the pedagogically and mathematically trialled and tested materials from sigma and mathcentre. This will include the video iPod materials that have recently been developed. We will supplement these with materials developed at the University of Bath which include:

- CAA for higher level mathematics units using AIM and MCQ using the Moodle VLE;
- Reflective journals in Moodle to enhance self reflection and assessment as a tool for learning in mathematics and statistics.

We will pilot the use of tablet PCs in the workshop and revision sessions to explore their potential for enhancing student learning and understanding. We welcome the opportunity to collaborate with sigma on the use of ICT, building on their experience to develop innovative ways to use technology in maths/stats support.

1.3 ***Start up*** Currently, mathematics/statistics support at the University of Bath takes place at the departmental level. To enhance this and provide university wide academic support will require consultation and co-ordination across the university. We will survey interested departments, via the Director of Studies, to determine

- which mathematical/statistical techniques and concepts cause difficulties for their students and
- the mathematical/statistical resources currently used within each unit of study.

We will invite departments to meetings before the launch of the centre to explain how it will operate and to get their input into the effective running of the centre.
We will publicise the centre extensively. New students will receive flyers in their welcome packs and the centre will be discussed during the library induction. Posters will be displayed across the university advertising the centre and it will be clearly signposted across campus. Links to the centre's website will be made from the library, student support and students union web pages. We will encourage all departments to provide links from their home pages and to promote the centre during their induction activities and to returning students.

1.4 ***Monitoring activities*** Monitoring activities which will be fully embedded in the operation of the centre will take several forms:

- We will audit the needs of academic departments and their programmes of study in respect of mathematics and statistics support at regular intervals (typically every 12 months).
- The online survey tool used at the University of Bath will be used to obtain regular feedback from the students regarding provision (once per semester). The peer tutoring programme will also be monitored using this tool for those receiving the training.
- We will record attendance at each session using University of Bath user IDs to collect data on levels of usage at the individual, programme, departmental, faculty and institutional level.
- We will provide information, on a semester basis, to departments indicating the nature of the provision sought by their students. This will allow the possibility for the centre to inform curriculum development. We will anonymise the data to maintain confidentiality of the students.

These activities will provide key information for the evaluation process which is described below. The advisory group will meet every 6 months to monitor progress of the centre and to provide guidance and support for future development. It will comprise one representative from each university faculty, the teaching fellow, the Director of Learning and Teaching, two local school teachers and Jane White. We would invite a member of the sigma team to join this group.

2. Key personnel

The **teaching fellow** will be responsible for the day to day running of the centre and will provide support to students via the drop in sessions, the workshops/revision sessions and by monitoring the on line discussion forums. S/he will arrange the choice of topic for workshops and revision sessions and will be responsible for monitoring activities. The teaching fellow will provide input for website development which will be carried out by administrative staff within the Department of Mathematical Sciences. This position will be suitable for an individual who has a degree with a strong mathematical and/or statistical component; we have already identified one suitably qualified and experienced person who has expressed interest in the position. We will follow university procedure on appointment of academic related positions.

The **Head of Centre**, ***Jane White***, will be responsible for the initial set up. She will work closely with the teaching fellow in the first year and will be responsible to sigma and the University of Bath for the delivery of the initiative. She will chair the advisory group.

3. Targeted Students

All students at the University of Bath will have access to the proposed centre. In the first two years there may be a bias towards mathematics undergraduates as the centre is being developed from a mathematics support programme within the Department of Mathematical Sciences.
n the Department of Mathematical Sciences there are approximately 225 students in each year cohort; the University of Bath has around 8500 undergraduate and 3500 postgraduate students across all disciplines. The need for mathematical and statistical support has been expressed in each academic department and therefore, at this stage, we anticipate that usage of the centre will reflect evenly those students studying quantitative modules or requiring data analysis as part of project work.

Around 15% of first year undergraduates in the Department of Mathematical Sciences make use of the current drop-in provision. We anticipate that a smaller proportion of the total student body will take advantage of the enhanced provision; however the potential usage of the centre is clearly great.
We would also like to make online resources available to the Foundation Degree students studying mathematics and/or statistics units at Bath City College; if the bid is successful we will develop links with the college for this purpose.

4. Evaluation and Dissemination

To evaluate how effectively the centre satisfies the aims of sigma we will use the data collected during the monitoring process to

- Determine the extent of student engagement with materials produced by sigma and mathcentre (Aim: To extend the support that sigma provides directly to students).
- Determine the effectiveness of self assessment and supported self study to develop study skills in mathematics and statistics. The effectiveness of self assessment can be evaluated by monitoring levels of self-referral to workshops and/or revision sessions. The effectiveness of supported self study will be evaluated in the first instance using qualitative data from student feedback forms. (Aim: To improve students experiences of learning mathematics and/or statistics).
- Determine participation and successful completion rates in the peer tutoring programme. We will also evaluate the individual components of the training programme to consolidate effective sessions and to revise the less effective sessions. (Aim: To improve students experiences of learning mathematics and/or statistics)

We also believe that the centre should

- Provide a focal point where students will know that they can seek mathematical/statistical advice
- Provide a supportive environment for learning
- Allow students to gain confidence in their quantitative skills thus enhancing learning capacity within their own discipline.

We will evaluate the first two bullet points using qualitative data from the monitoring process. For the third, we would like to determine whether the centre has any impact on student achievement by combining the data collected from the centre with that collected centrally on student achievement. This could be highly complex and so we will seek advice from sigma and Professor William Scott (Education department, University of Bath), an expert on evaluation of teaching and learning in HE, to ensure that we carry out an effective and accurate evaluation of the centre in this respect.
An annual report will be provided for the University of Bath Learning and Teaching Committee and this will include an evaluation of the activities and their anticipated outcomes. The results of all evaluation will be used consolidate good practice and to inform development of the resources centre and associated peer tutor training programme.

Dissemination will take place internally via events arranged by the centre and through communication channels of the Learning and Teaching Enhancement Office. At all stages we will encourage participation of colleagues from all academic disciplines and we will use the range of communication mechanisms within the University to disseminate outcomes of the initiative. We hope that sigma will make use of some of the materials which we will develop for higher level mathematics units and, as a partner institution, that we will have access to all dissemination routes used by sigma. We would like the opportunity to share our experiences of mathematics/statistics support at a national level; such opportunities will arise through the HEA for MSOR at their annual meeting and by writing articles for their newsletter *Connections.*
The peer tutoring programme will also be evaluated and disseminated using these mechanisms. In addition, we are intending to run a *good practice* workshop on peer tutor training which will provide opportunities for us to share our experience of the training programme at a national level.

5. Continuation of Initiative from Aug 2009

The timing of this proposal coincides with an institutional review of academic student support at the University of Bath. The mathematics resources centre will fit naturally within any institutional level student support and will provide a key component of that academic support. Therefore we are confident that the resources centre will continue to receive institutional funding to maintain ongoing provision once the sigma funding has ended.