Mathematics Learning Centre
Room 455, Carslaw Building

Tel: +61 2 9351 4061
Fax: +61 2 9351 5797

Email: mlc@stuserv.usyd.edu.au
www.usyd.edu.au/mlc

Mathematics Learning Centre
The University of Sydney
NSW 2006
STAFF OF THE MATHEMATICS LEARNING CENTRE 2005

Jacqueline Nicholas
Head, Senior Lecturer
BSc MSc Hull

Susan Gordon
Senior Lecturer
BSc MSc Witw, DipEd DipDatametrics S.A., PhD

Collin Phillips
Senior Lecturer
BSc DipEd PhD

Catherine Kennedy
Administrative Assistant

Casual Teaching Staff:

Faisal Ababneh
BSc MSc Yarmouk

Melissa Cox
BSc PhD

Stephen Goulter
BSc Cant, MSc DipORS Well, PhD

Alistair Merrifield
BSc BCA MSc Well

Krishnasamy Muraleedaran
BSc Sri Lanka, MSc

Leah Radliff
BSc N’cle

Devindri Perera
MSc Tokyo Inst Tech

Lei Zhang
BSc MSc
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Figure 4: SCEQ mean scores of all postgraduate coursework students and all CHS postgraduate coursework students on the quality of MLC service for 2001 to 2005
Executive Summary

In 1984, the University of Sydney established a Mathematics Learning Centre to provide academic support for undergraduate students who, because of their background in mathematics, are considered “at risk” when studying mathematics or mathematics-based courses.

The Mathematics Learning Centre is a unit of Student Services.

The operational goals of the Mathematics Learning Centre are:

*To provide a comprehensive range of academic support programs in mathematics and statistics to address the development of students’ learning in mathematic and statistics;*

*To conduct research and development projects in the fields of mathematics and student learning of mathematics and statistics and disseminate outcomes through publications and conference presentations.*

By pursuing these operational goals the Mathematics Learning Centre contributes to the University of Sydney Strategic Plan.

A wide range of teaching programs have been developed to meet the needs of those undergraduate students who enter the University without the mathematical knowledge, skills and confidence that are needed for studying first level mathematics or statistics units of study at university. Students attend the Centre’s programs voluntarily.

Programs and resources available to students in 2005 included:

- Bridging courses in mathematics and statistics (fee paying)
- A Drop-in Centre where students can receive individual assistance
- Supplementary tutorials and lectures
- Written and computer resources for self-paced study

The Mathematics Learning Centre provides academic support for and oversees the University Preparation Courses in mathematics and acts as faculty liaison in mathematics for the University of Sydney Foundation Program.

In 2003, the Mathematics Learning Centre User Advisory Committee confirmed that the primary purpose of the Mathematics Learning Centre was the support of eligible undergraduate students. During 2004, it was determined that postgraduate student groups would be eligible for assistance only with funding from the appropriate Faculty.

**Staff profile 2005**

The number of Mathematics Learning Centre staff was unchanged in 2005 with 2.5 full-time equivalent academic staff in continuing positions (2.5 Senior Lecturers) and one 0.57 administrative staff member. Eight casual teaching staff were employed during 2005.
The Mathematics Learning Centre Week

A description of a busy week during Semester will give the reader a snapshot of the teaching activities of the Mathematics Learning Centre.

Week 9 was the fourth busiest week in Semester 1 with the Drop-in Centre attendance being 194 student hours (student hours = no. of students × no. of hours in attendance). The mean attendance for the Drop-in Centre for Semester 1 was 156 student hours. During Week 9, the Drop-in Centre was open for 36 hours during which time 67 students visited with 36 students making multiple visits. There were a total of 142 visits. There were seven supplementary tutorials run in this week covering five units of study in mathematics and statistics. The supplementary tutorials were attended by 58 students in total. Four lunchtime lectures in calculus were given, which were attended by an average of 19.8 students. In addition, in a typical week, students frequently seek advice from the academic staff. There are many telephone calls requesting advice of a varying nature from within the University or externally. These frequently require the attention of an academic staff member.

Student attendance

Since 2004, we have had access to the HSC enrolment data of commencing students. These data include information on the level of mathematics studied for the HSC and the mark attained by the student. We used these data in 2005 to further refine our targeting strategies for the Centre’s programs.

There was a 14% increase in the number of students enrolled in bridging courses in 2005 compared to 2004. There was a 2.5% decrease in the number of students registering for the Drop-in Centre compared to 2004. Table 1 below summaries the student enrolments for the years 2002 to 2005.

<table>
<thead>
<tr>
<th>Source</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bridging courses</td>
<td>257</td>
<td>227</td>
<td>185</td>
<td>211</td>
</tr>
<tr>
<td>University Preparation Course</td>
<td>125</td>
<td>126</td>
<td>100</td>
<td>90</td>
</tr>
<tr>
<td>Drop-in Centre</td>
<td>727</td>
<td>690</td>
<td>628*</td>
<td>608*</td>
</tr>
</tbody>
</table>

*Eligibility criteria tightened by using HSC data to identify and target students

In 2005, there was a 5% increase in the total student hours of attendance from all sources compared to 2004. Drop-in Centre attendance stayed about the same while supplementary tutorial and lecture attendance increased by 20% compared to 2004. Table 2 gives a comparison of student use of the Centre’s programs for the years 2002 to 2005.
### Table 2: Student hours of attendance for the years 2002 to 2005

<table>
<thead>
<tr>
<th>Student hours attendance all sources</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drop-in Centre</td>
<td>5862</td>
<td>5381</td>
<td>4793</td>
<td>4783</td>
</tr>
<tr>
<td>Tutorial classes</td>
<td>1874</td>
<td>1426</td>
<td>1577</td>
<td>1887</td>
</tr>
<tr>
<td>Total</td>
<td>7736</td>
<td>6807</td>
<td>6370</td>
<td>6670</td>
</tr>
</tbody>
</table>

**Student Profile 2005**

**Undergraduate** students made up 87.5% of our total enrolments (a decrease from 89.7% in 2004). There were more female students than male students in our enrolments – 59% compared to 41%, with the percentage of female enrolments decreasing from 63% in 2004. There was a change in the percentage of our students who were enrolled in the **College of Sciences and Technology** at 58% down from 62% in 2004. The percentage of students enrolled in the **College of Humanities and Social Sciences** was 27%, the same percentage as for 2004. There was a slight decrease in the percentage of students in the **17 to 20 year age group** from 56.5% in 2004 to 56.3% in 2005. In 2005, 25% of the Centre’s students spoke a **language other than English** as their first language compared to 27% in 2004. **International** fee paying students made up about 13% of the Centre’s enrolments compared to 17% in 2004. This was due to the absence of international postgraduate students for the Faculty of Economics and Business using the Drop-in Centre. Seven workshops were organised in 2005 to meet the needs of these students.

**New teaching projects in 2005**

- The introductory calculus lecture series for students “at risk” from the Faculty of Agriculture was extended in Semester 1 2005 from 16 lectures to 20 lectures. These lectures ran in the Semester prior to the unit of study BIOM1003, and were funded jointly by the Mathematics Learning Centre and the Faculty of Agriculture.

- A complete revision of the MLC tutorial program for the new six credit point course, PSYC2012: Statistics and Research Methods for Psychology, was undertaken. This unit of study replaced a four credit point unit of study.

- Work continued with the Faculty of Economics and Business to develop a website with mathematics quizzes and resources, and a workshop series to assist their students learn mathematics. Seven workshops were given in 2005 (4 in Semester 1 and 3 in Semester 2) and the website became operational in July. The project was funded by the Faculty.

**Highlights of research and scholarship**

Research and participation in the appropriate academic community is an important part of the work of the academic staff of the Mathematics Learning Centre. Highlights for 2005 include:
• Dr Sue Gordon continued in the position of Honorary Senior Lecturer in the School of Development and Learning, Faculty of Education and Social Work. The title was conferred March 2003 to March 2006 in recognition of “significant contribution to the teaching and research of the school”.

• Dr Sue Gordon was reappointed principal supervisor of a PhD candidate in the Faculty of Education and Social Work.

• One journal article was published.


• Dr Collin Phillips continued his work on the “Magnetohydrodynamic instabilities of the Earth’s core and their geophysical implications”. A preliminary study was initiated as preparation for his Special Studies Program in Semester 1 2006. A project, using numerical linear stability analysis of magnetohydrodynamics in a sphere including anisotropic diffusivity, was developed and will form the basis of the Special Studies Program project.

• Dr Collin Phillips (with Dr D. Ivers of the School of Mathematics and Statistics) developed a new project to investigate the effects of anisotropic thermal diffusion in a rotating electrically conducting fluid sphere.

• Dr Sue Gordon continued her collaborative research project into international educators’ ideas on teaching and learning statistics as a service course at university. Dr Gordon presented a paper on the project at the ISI/IASE Satellite Conference on Statistics Education and the Communication of Statistics, Sydney, April. An invited paper on the project is in preparation for the 7th International Conference on Teaching Statistics (ICOTS7) Salvador, Bahia, Brazil, July 2006. A journal paper is in preparation.

• Dr Sue Gordon and Ms Jackie Nicholas continued their analysis of case studies on university teachers’ perceptions about memorising in teaching and learning mathematics and statistics. A paper was presented at the 29th Conference of the International Group for the Psychology of Mathematics Education Melbourne, July.

• Dr Collin Phillips (with Dr D. Ivers) significantly extended their research to investigate magnetic instabilities in the Earth’s core to include an investigation of the effects of vanishing surfaces of the basic state magnetic field on the stability of a rotating conducting fluid sphere. The work resulted in a journal article.

• Staff contributed to the reviewing work of research journals and conferences.
1 Overview

1.1 Introduction

In 1984, the University of Sydney established a Mathematics Learning Centre to provide academic support for undergraduate students who, because of their background in mathematics, are considered “at risk” when studying mathematics or mathematics-based courses. The Mathematics Learning Centre assists students to develop the mathematical knowledge, skills and confidence that are needed for studying first level mathematics or statistics units of study at university.

In 2003, the Mathematics Learning Centre User Advisory Committee confirmed that the primary function of the Centre was to provide academic support to eligible undergraduate students. During 2004, it was determined that postgraduate student groups would be eligible for assistance only with funding from the appropriate Faculty. A grandfather provision was included in this policy to cover a small group of postgraduate students in the School of Public Health as these students had been supported by the Centre for many years.

1.2 Target groups

Students are eligible to attend the Centre’s programs if they do not have the assumed knowledge in mathematics they need for their first level mathematics or statistics units of study.

The Centre targets students from the following groups:

• People who have not studied the appropriate level of mathematics at school which is assumed for their university studies;

• Mature age students who have not studied mathematics for several years;

• Students from overseas who may find gaps in their mathematical knowledge, or who are not familiar with mathematical terms in English;

• Students whose studies have been interrupted by either illness or accident or some other cause;

• Students from equity groups;

• Anyone who lacks confidence in their ability to learn the mathematics or statistics needed for their first level units of study.

1.3 Initial visit

When a student first visits the Centre, his or her mathematical background is assessed against the assumed knowledge for their units of study. The student is then advised about Mathematics Learning Centre programs that are suitable for his/her needs. Students, who are not considered eligible at this first visit, are referred back to the appropriate teaching staff in their unit of study.
2 Attendance

In 2005, students attending the Centre were enrolled in degree courses in the Faculties of Agriculture, Arts, Economics and Business, Education, Engineering, Medicine, and Science.

Information about the Centre’s services is provided to students via posters at enrolment sites, through announcements at orientation programs and at lectures during the first or second week of Semester. In 2005, HSC data of students enrolled in the major mathematics or statistics units of study was used to target eligible students. The students identified as those who did not have the assumed knowledge for their units of study or for whom HSC data was not known, were emailed directly.

Students are asked to fill out a registration form when they first come to the Centre. The students also sign a sheet each time they use the Centre recording the hours spent working at the Centre. However, although improvements were made to our data collection procedures in 2002, some students who attended the Centre do not formally register with us, and others forget to record their attendance every time they attend. Therefore, attendance statistics may underestimate the Centre’s use. All attendance in the Centre’s programs is voluntary.

2.1 Summary statistics for 2005

2.1.1 Enrolment and attendance statistics for 2005

Table 3: Number of students all sources for 2005

<table>
<thead>
<tr>
<th>Source</th>
<th>No. of students</th>
</tr>
</thead>
<tbody>
<tr>
<td>University Preparation Courses</td>
<td>90</td>
</tr>
<tr>
<td>Bridging courses</td>
<td>211</td>
</tr>
<tr>
<td>Drop-in Centre and tutorial and lecture programs</td>
<td>608*</td>
</tr>
</tbody>
</table>

*432 registered students, 176 unregistered students

Table 1: Number of students all sources for the years 2002 to 2005

<table>
<thead>
<tr>
<th>Source</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bridging courses</td>
<td>257</td>
<td>227</td>
<td>185</td>
<td>211</td>
</tr>
<tr>
<td>University Preparation Course</td>
<td>125</td>
<td>126</td>
<td>100</td>
<td>90</td>
</tr>
<tr>
<td>Drop-in Centre</td>
<td>727</td>
<td>690</td>
<td>628*</td>
<td>608*</td>
</tr>
</tbody>
</table>

*Eligibility criteria tightened by using HSC data to identify and target students
Table 2: Student hours of attendance for the years 2002 to 2005

<table>
<thead>
<tr>
<th></th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drop-in Centre</td>
<td>5862</td>
<td>5381</td>
<td>4793</td>
<td>4783</td>
</tr>
<tr>
<td>Tutorial classes</td>
<td>1874</td>
<td>1426</td>
<td>1577</td>
<td>1887</td>
</tr>
<tr>
<td>Total</td>
<td>7736</td>
<td>6807</td>
<td>6370</td>
<td>6670</td>
</tr>
</tbody>
</table>

Table 4: Attendance data all sources for 2005

<table>
<thead>
<tr>
<th>Daytime Attendance</th>
<th>Semester 1</th>
<th>Semester 2</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student hours in classes</td>
<td>1551</td>
<td>336</td>
<td>1887</td>
</tr>
<tr>
<td>Student hours in Drop-in Centre</td>
<td>2422</td>
<td>2197</td>
<td>4619</td>
</tr>
<tr>
<td>Other attendance</td>
<td>140</td>
<td>24</td>
<td>164</td>
</tr>
<tr>
<td>Total student hours attendance</td>
<td>4113</td>
<td>2557</td>
<td>6670</td>
</tr>
</tbody>
</table>

The total student hours of attendance in 2005 was 6670 compared to 6370 in 2004, and 6807 in 2003. This was an increase of 4.7% from 2004, and a decrease of 2% from 2003. Figure 1 shows the total number of hours of student attendance for ten years from 1996 to 2005. It is difficult the identify the reasons for the yearly variations in attendance.

Figure 1: Student hours of attendance 1996 to 2005
Table 5: Percentage of undergraduate and postgraduate registrations of Mathematics Learning Centre for the years 2003 to 2005

<table>
<thead>
<tr>
<th>Degree</th>
<th>Percentage of MLC registered students</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2003</td>
</tr>
<tr>
<td>Undergraduate</td>
<td>87.5</td>
</tr>
<tr>
<td>Postgraduate</td>
<td>9.8</td>
</tr>
<tr>
<td>Other</td>
<td>2.3</td>
</tr>
<tr>
<td>Not known</td>
<td>0.4</td>
</tr>
</tbody>
</table>

* Includes Graduate Diploma of Psychology students undertaking the undergraduate unit of study PSYC2021

Table 6: Student enrolment in the Mathematics Learning Centre by faculty

<table>
<thead>
<tr>
<th>Faculty</th>
<th>Percentage of total MLC enrolments</th>
<th>% of university enrolment (2005)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2003</td>
<td>2004</td>
</tr>
<tr>
<td>Science</td>
<td>39.3</td>
<td>48.9</td>
</tr>
<tr>
<td>Arts</td>
<td>13.3</td>
<td>13.5</td>
</tr>
<tr>
<td>Engineering</td>
<td>8.1</td>
<td>8.5</td>
</tr>
<tr>
<td>Economics and Business</td>
<td>21.3</td>
<td>9.0</td>
</tr>
<tr>
<td>Medicine</td>
<td>4.1</td>
<td>2.9</td>
</tr>
<tr>
<td>Education</td>
<td>4.4</td>
<td>4.4</td>
</tr>
<tr>
<td>Agriculture</td>
<td>5.1</td>
<td>4.5</td>
</tr>
<tr>
<td>Other</td>
<td>4.5</td>
<td>8.4</td>
</tr>
</tbody>
</table>

2.1.2 Gender and age profile

Gender

In 2005, 59% of the students attending the Centre were female. Table 7 gives comparative data for the years 2003 to 2005.

Table 7: Percentage of the Mathematics Learning Centre registrations from 2003 to 2005 by gender

<table>
<thead>
<tr>
<th>Gender</th>
<th>Percentage of total MLC registered students</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2003</td>
</tr>
<tr>
<td>Female</td>
<td>64.3</td>
</tr>
<tr>
<td>Male</td>
<td>35.7</td>
</tr>
</tbody>
</table>
**Age**

The Centre has a sizable population of mature aged students. In 2005, about 43% of the Centre’s students were over 21 years in age. This percentage was about the same as that for 2004. A breakdown in age is given in Table 8 together with the total enrolment for the University in those categories. However, it should be noted that as the Centre caters mainly for first year undergraduate students, a direct comparison is inadvisable.

<table>
<thead>
<tr>
<th>Age in years</th>
<th>% of total MLC enrolments</th>
<th>% of total university enrolments (2005)</th>
</tr>
</thead>
<tbody>
<tr>
<td>17-20</td>
<td>53.6</td>
<td>56.3</td>
</tr>
<tr>
<td>21-24</td>
<td>22.5</td>
<td>21.1</td>
</tr>
<tr>
<td>25-29</td>
<td>9.0</td>
<td>10.9</td>
</tr>
<tr>
<td>30+</td>
<td>14.3</td>
<td>11.1</td>
</tr>
<tr>
<td>Not stated</td>
<td>0.6</td>
<td>0.007</td>
</tr>
</tbody>
</table>

### Table 8: Distribution of ages for students attending the Centre from 2003 to 2005

2.1.3 **Cultural diversity**

The Centre has a culturally diverse student population. In 2005, 25% of the Centre’s students reported speaking a language other than English as their first language. This percentage slightly decreased from 27% in 2004. A three year comparison is given in Table 9.

<table>
<thead>
<tr>
<th>Student characteristic</th>
<th>% of MLC total enrolment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Language other than</td>
<td></td>
</tr>
<tr>
<td>English as first language</td>
<td>2003</td>
</tr>
<tr>
<td></td>
<td>25.6</td>
</tr>
</tbody>
</table>

### Table 9: Percentage of Centre students who speak a language other than English as their first language for years 2003 to 2005

**International fee paying students**

In 2005, about 13% of the Centre’s students were international fee paying students compared to 17% in 2004. A three year comparison is given in Table 10.
Table 10: Percentage of Centre students who are international fee paying students for years 2003 to 2005

<table>
<thead>
<tr>
<th>Student characteristic</th>
<th>% of MLC total enrolment</th>
</tr>
</thead>
<tbody>
<tr>
<td>International fee paying student</td>
<td>2003</td>
</tr>
<tr>
<td></td>
<td>21</td>
</tr>
</tbody>
</table>

The decrease in international fee paying students in 2005 compared to that of 2004 and 2003 corresponds to the decrease in postgraduate students assisted by the Centre. The needs of postgraduate students could not be appropriately accommodated in the Centre’s existing programs. Consultations with the Faculty of Economics and Business were instigated and have resulted in the development of a program to meet the needs of their postgraduate students. This program was implemented in 2005, and funded by the Faculty. In 2005, seven workshops were held and attended by, on average, 24.6 students. Fifty seven percent of the students who attended were postgraduate students and 58% were international students.
3 Teaching Activities of the Centre

The Centre provides support for students in the form of lectures, workshops, small group teaching, self paced study and individual assistance in the Drop-in Centre. Students attend the Centre on a voluntary basis and as frequently as they wish.

3.1 Drop-in Centre

Students can attend the Drop-in Centre at any time during opening hours. We have one lecturer available to help students at all times and two at predictably busy periods.

The Centre was open this year from 10 am to 5 pm on Monday, Wednesday and Thursday, from 10 am to 3 pm on Friday and from 10 am to 7 pm on Tuesday (7 pm close only during teaching weeks), during teaching weeks, stuvac and the examination period. The Centre was closed for two weeks in each of January, July and December. The Centre was open during other university vacation periods on a restricted basis.

In 2005, attendance at the Drop-in Centre accounted for about 72% of total attendance.

The Drop-in Centre is an informal environment where individual assistance is tailored as far as possible to each student’s needs. We aim to develop a learning culture – one where students are expected to understand the mathematics they are studying and learn to think for themselves.

The informality of the Drop-in Centre allows students to meet others with similar difficulties. Students are encouraged to work together, and to explain concepts to each other. Frequently, students who meet in the Centre form groups to study mathematics as well as other subjects. In the past, these study groups have continued into higher years.

Students value the ease of access, the individual assistance and being in an environment with students with similar needs. Some typical responses to the question: The best thing about the individual assistance at the MLC was:-

“My questions can be answered. I’m not just listening to the questions of a larger class.”

“The tutors all gave on in depth and understandable explanation of the topics being studied. This has been extremely helpful, as it has allowed me to fully comprehend the mathematical principles involved in my study.”

“Helping me to identify what it is that holds me back from achieving my best in mathematics.”

“I was able to be shown things until I understood them completely. Also, as there were different teachers each time I came into the MLC, I was able to get a different perspective, which really helped me to learn!”

(Student surveys, 2005)
3.2 Small group tutorials

During 2005, supplementary tutorials were held for students in the following units of study: Economics and Business Statistics 1A and 1B, Mathematics 1 (normal), Mathematics for Life Sciences, Psychology Statistics, Introductory Biostatistics (for graduate courses in Public Health) and Calculus for Pharmacy.

Students are encouraged to join one of our supplementary tutorials whenever possible, both for reasons of efficiency and because we believe group discussion and co-operative work lead to more effective learning.

The students value the supplementary tutorials as an important opportunity to learn mathematics or statistics and also as a forum for meeting other students with similar difficulties. These points are raised again and again in the student surveys.

In 2005, some of the supplementary tutorials were quite large (up to 26 students). Also, it is difficult to find a tutorial time to suit all interested students. Again in 2005, some supplementary tutorials were scheduled at 8 am.

Snapshot of a supplementary tutorial

A supplementary tutorial for the unit of study PSYC2021 ran on Wednesday at 12 noon for 13 weeks during Semester 1. This tutorial was attended by an average of 9.2 students per week. Seventeen students attended this class at least once, with eleven students attending a majority of the classes. The average mark for these eleven students in PSYC2021 was 60% with one student failing, seven students achieving a pass, two a credit and one student achieving a distinction.

The students rated the supplementary tutorial very highly. In a combined survey of this class and an identical PSYC2021 class held in the same week, 91% of students rated the supplementary tutorial as excellent, the highest category on a five point scale.

3.3 Short lecture courses

Calculus from Scratch

An introductory calculus course, “Calculus from Scratch” was taught in Semester 1. The classes were organised as a response to the large number of students enrolled in the Mathematics for Life Sciences units of study who had not studied calculus before. Students who attended the Mathematics (2 Unit) bridging course were also encouraged to attend to consolidate their knowledge and skills. The class met for 23 hourly sessions at lunchtime with an average of 18 students attending each session. Students were provided with access to lecture
notes at the beginning of each week via the internet. Of the 17 students who attended 10 or more of the lectures, 3 failed, 7 gained passes and 3 gained credits in MATH1011 Calculus. The results for a further 4 students are not known.

**Calculus lectures for students from the Faculty of Agriculture**

For the first time in 2005, a series of 20 calculus lectures and 5 tutorials was developed and taught in Semester 1 for students enrolled in the Semester 2 unit of study Biometry (BIOM1003) in the Faculty of Agriculture. This initiative was partially funded by the Faculty and took place from Week 2 to Week 11. Students who had not studied HSC Mathematics (or a higher level mathematics course for the HSC or equivalent), or who had achieved a result in HSC Mathematics of less than Band 4 (70%) were timetabled and encouraged to attend. Forty three students attended the lectures with, on average, 27.4 students attending each lecture. Thirty students attended a majority of the lectures and tutorials.

3. 4 **Mathematics workshops**

In 2005, a series of workshops were developed and taught for undergraduate and postgraduate students in the Faculty of Economics and Business. These workshops were a joint initiative of the Faculty of Economics and Business and the Mathematics Learning Centre, and funded by the Faculty of Economics and Business. In Semester 1, four workshops were run and were attended by an average of 24 students. In Semester 2, three workshops were run and attended by an average of 25 students. The students rated the workshops highly with an average of 79% rating the workshops in the highest two categories on a five point scale.

3. 5 **Self paced study**

The staff of the Centre have spent considerable time developing and writing booklets on many topics in mathematics and statistics. Students are encouraged to use these booklets for self-paced study. A booklet titled The Normal Distribution was in preparation in 2005. The number of booklets available in this series is 21, currently selling for $5 + GST to students from the University of Sydney and $8.00 + GST to others. During 2005, nine booklets were published on the Mathematics Learning Centre website.

Students have access to a range of computer based mathematical materials in the Drop-in Centre. These include commercial software for developing concepts in statistics and calculus and the Computer Algebra System, Mathematica™. Students can also use the Centre’s computers to access their unit of study materials on the internet.
3. 6 Individual consultations

A limited number of individual consultations for a student referred to us from Disability Services was offered in 2005. This student could not be catered for in our regular programs. No students were referred to us from the Koori Centre.

3. 7 Student consultations

In addition to the formal teaching activities of the Centre, we spend a considerable time advising students about matters concerning assumed knowledge in mathematics and bridging courses. Students who intend to apply or have applied for entry to the University approach us for advice about their preparation for the study of mathematics based courses at university. We provide advice to prospective students about suitable bridging courses by phone and in person via the Bridging Course booth at Courses and Careers Day and Information Day.

3. 8 Bridging courses

The Mathematics Learning Centre organises bridging courses in mathematics and statistics in February each year. Students pay a fee for these courses bringing in a modest income for the Centre.

3. 8. 1 Mathematics

During February, the Centre, jointly with the School of Mathematics and Statistics, offered Bridging Courses in Mathematics at the Mathematics (2 Unit) and Mathematics Extension 1 (3 Unit) level. The courses ran for 24 hours over 12 working days and a fee of $280 was charged. In 2005, 176 students attended these courses compared to 157 students in 2004. The students are taught in classes of between 15 and 20 students for 2 hours per day and are encouraged to come to the Drop-in Centre for a further two hours where assistance is available.

Responses to student surveys show that students appreciate the small class format which allows them to get to know their fellow students and tutor and believe that the bridging course will help them in their university studies. Again in 2005, a WebCT site was maintained for the Mathematics (2 Unit) bridging course.

3. 8. 2 Statistics

The Centre again offered its Bridging Course for Statistics course in February 2005. This course ran for eighteen hours over a two-week period and a fee of $210 was charged. Thirty five, who were enrolling in Psychology 2012 Statistics or Introductory Biostatistics for postgraduate students in Public Health, attended this course. The course aims to introduce students to some of the concepts they will study in statistics, to provide a mathematical base for
the future study of statistics and to ameliorate the fears students may have about studying statistics.

Again in 2005, parallel courses were taught with students allocated to a stream according to their unit of study enrolment. This allowed for the courses to be more finely tuned to the needs of the students. The timing of the bridging course for Introductory Biostatistics students was changed from the morning to late afternoon in response to feedback from student surveys. Casual teachers were employed to cover the increased teaching load.

The courses were highly rated by the students. In a survey at the end of the courses, over 84% of students surveyed (27 of 32) rated the courses in the two highest of five categories. About 88% of students reported that their confidence in learning mathematics had increased.

“It covered a lot of material systematically. The booklets were very good.”
(Introductory Biostatistics student, 2005 survey)

“The teachers were very easy to understand and they explained things thoroughly.”
(Psychology student, 2005 survey)

3.9 Continuing Education courses

The Centre, together with the Centre for Continuing Education, offers a University Preparation Course in mathematics to adults in the wider community. University Preparation Courses prepare students, who do not meet the usual entry standards and who satisfy other selection criteria, to enter a university course. This course is the recommended University Preparation Course for a wide range of degree programs. The assumed knowledge for this course is Year 10 advanced mathematics.

In 2005, approximately 90 students enrolled in the course Preparatory Mathematics. Thirty-four students completed the course (excluding those who deferred the final exam) of whom 26 passed the course with 21 students gaining a grade of credit or better.

3.10 New initiatives

The Mathematics Learning Centre and the Centre for the Advancement of Learning in Economics and Business (CALEB), Faculty of Economics and Business continued work on a project to improve the mathematics learning of their students. In 2005, a series of web-based mathematics quizzes were develop and implemented on generic background knowledge in mathematics for economics and business units of study. A workshop series was organised and taught for postgraduate and undergraduate students. Seven workshops were given, four in Semester 1 and three in Semester 2. They were attended by, on average, 24.6 students. Fifty seven percent of the students were postgraduate students and 57% were international students.
4 Research and Scholarship

4.1 Research projects

Mathematics Learning Centre has a strong research culture. It has a national and international reputation for high quality research. All current academic staff members are active researchers in either mathematics (or statistics) education or mathematics.

This section gives details of the research projects of the Centre. Full publication details are given in section 4.2.

Project: Case Studies on University Teachers’ Perceptions of Memorising in Teaching and Learning Mathematics

Researchers: Dr Sue Gordon, and Ms Jackie Nicholas

This project builds on and develops the interdisciplinary investigation into the role of memorising in learning science (Cooper, I., Frommer, M., Gordon, S., Nicholas, J, 2002). Case studies on 5 mathematicians are being analysed to flesh out and increase an understanding of academics’ perceptions about memorising related to their own learning of mathematics or statistics, to teaching and to students’ learning. A conference paper was presented at the 29th Conference of the International Group for the Psychology of Mathematics Education, Melbourne July (Gordon & Nicholas, 2005).

References


Project: Teaching and Learning Statistics at University

Researchers: Dr Sue Gordon, Associate Professor Peter Petocz and Associate Professor Anna Reid

This project was initiated and developed as Dr Sue Gordon’s SSP program in 2004 and is a collaborative project with Associate Professor Anna Reid, Institute of Higher Education &
Research & Development, Macquarie University, and Associate Professor Peter Petocz, Dept of Statistics, Macquarie University. The project builds on the investigators’ research into learning statistics (eg Gordon, 2004) and researches statistics teachers’ ideas about teaching and learning statistics at university and ways of developing professionally as statistics educators.

The investigation consists of a series of in depth, e-mail interviews with university statistics educators from around the world and focuses on “service courses”, where statistics is taught to groups of students from various disciplines, such as psychology, public health, education and business. Email interviews were conducted with 37 members of the International Association for Statistics Education (IASE) and 9 Australian educators. Participating educators are from many countries including Argentina, Australia, Belgium, Brazil, Israel, Italy, Netherlands, New Zealand, Slovenia, Spain, Uganda and the USA.

A conference paper was presented at the ISI/IASE Satellite Conference on Statistics Education and the Communication of Statistics (Gordon, Reid & Petocz, 2005). An invited paper on the project is in preparation for the 7th International Conference on Teaching Statistics (ICOTS7) Salvador, Bahia, Brazil, July 2006. A journal paper is in preparation.

References


Project:  

**Linear Stability Analysis of Earth’s Core and Anisotropic Diffusivities**

Researchers: **Dr Collin Phillips** and Dr David Ivers

Advanced linear stability models of the earth’s core performed by other researchers in the past have attempted to explore aspects and features of the Earth’s magnetic field.

A current important question in magnetohydrodynamics concerns the influences and effects of anisotropic diffusivities. This project investigates the effects of anisotropies with preferred directions aligned with the axis of rotation. Anisotropies are enhanced and diminished along this direction.

The linear stability analysis of magnetohydrodynamic models for the Earth's core is considered. The momentum, induction and heat equations for an electrically-conducting Boussinesq fluid in a uniformly rotating frame are linearised about a steady basic state. Numerical implementation of the equations utilises vector spherical harmonic analysis, whereby the vector and scalar spectral equations are coded directly. The resulting numerical code has been extensively benchmarked against kinematic dynamo models, thermal convection and magneto-convection.
Previous numerical investigations (Soltis, Bretensky & Seucik, 2004) include the examination of the linear stability properties of magnetohydrodynamic models in infinite layers or slabs of conducting fluids, to investigate the linear stability of a conducting fluid under the influence of (initially) anisotropies in the thermal diffusion. This project significantly extends existing work.

Reference

Project: Spectral Equations for Spherical Magnetohydrodynamics

Researchers: Dr C.G.Phillips and Dr D.J.Ivers

An extensive ongoing project has been conducted to produce spectral equations for Magnetohydrodynamic interactions relevant to the Earth’s core. The work utilizes vector and tensor spherical harmonics to produce interaction type equation. The advanced techniques allow derivation of equations that would be unattainable using past conventional methods (Phillips and Ivers 2001; 2003). This project has been extended from equations governing a Boussinesq conducting fluid to a fluid governed by the anelastic approximation. The gas giant planets such as Jupiter and Saturn are formed of conducting fluids. These fluids are regarded as being well modelled by the anelastic approximation. Hence the spectral equations derived in this project allow numerical simulations of the magnetohydrodynamic interactions of these gas giants to be developed.

The vector spectral equations are derived for the momentum, induction and heat equations where the fluid is extended to be governed by the anelastic approximation as opposed to a Boussinesq fluid. The fluid may be readily confined to a sphere and may be electrically conducting. These vector spectral equations together with the vector (and tensor) spherical harmonic analysis is used (with considerable algebraic manipulation) to derive the more conventional toroidal poloidal forms of the interaction type spectral equations, for the momentum, induction and heat equations. The hybrid (combined vector spectral and conventional spectral) forms of these equations are also developed.

References

4. 2 Publications, presentations and scholarly work

4. 2. 1 Journal articles


4. 2. 2 Refereed conference proceedings


4. 2. 3 Conference presentation

How important are communication skills for 'good' statistics students? - An international perspective. Paper presented (by Dr Sue Gordon) at the *ISI/IASE Satellite Conference on Statistics Education and the Communication of Statistics*, Sydney.

4. 2. 4 Work in progress


Gordon, S., Reid, A. & Petocz, P. (In preparation) Understanding teachers’ experiences of teaching service statistics courses

4. 3 Research supervision

Dr Sue Gordon was reappointed Principal Supervisor of PhD candidate, Ms Kathleen Fittler, in the School of Development and Learning, Faculty of Education and Social Work. Ms Fittler’s project is titled: Innovation in Learning and Science: A Cultural Historical Activity Theory Perspective.
5 Contributions to the University, the Profession, and the Community

5.1 Contributions to the University

The staff of the Mathematics Learning Centre participate in the following activities:

- Courses and Careers day and the Prospective Students Information days
- SWOT (Sydney Welcome Orientation and Transition)
- Broadway Orientation
- Faculty Orientation sessions

Individual staff contributions to the University were:

Dr Sue Gordon
- Principal Supervisor to PhD candidate, Faculty of Education and Social Work
- Examiner of University of Sydney doctoral candidate in the Faculty of Education and Social Work

Ms Jackie Nicholas
- Head of Exam Committee for the University Preparation Course in Mathematics
- Faculty liaison (mathematics) with the University of Sydney Foundation Program
- Member SWOT Project group
- Member of the Graduate Generic Attributes Project group

Dr Collin Phillips
- Member of the Exam Committee for the University Preparation Course in Mathematics

5.2 Contributions to the profession and the community

Throughout the year, all Mathematics Learning Centre staff provided advice to current and prospective students and members of the general community about mathematical matters. This includes advice about the assumed mathematical knowledge required for various university courses, and details of the bridging and preparation programs available in Sydney and elsewhere.

Other contributions to the profession and the community were:

Dr Sue Gordon
- Reviewer of research papers and conference papers:
  - Statistics Education Research Journal
  - Mathematics Education Research Journal
  - 28th Annual Conference of the Mathematics Education Research Group of Australasia
6 Professional Development

As a part of the Centre’s professional development activities, the staff attend conferences and seminars in their discipline area. Administrative staff undertake appropriate internal training.

6.1 Appointment

Dr Sue Gordon continued her appointment as Honorary Senior Lecturer in the School of Development and Learning, Faculty of Education and Social Work. This appointment, from March 2003 to March 2006, recognized her significant contribution to the teaching and research of the School.

6.2 Conferences, seminars, forums and workshops

Dr Sue Gordon commenced the final module of the Institute of Teaching and Learning Development Program For Research Higher Degree Supervision. This is an accreditation module requiring the study of 6 previous modules and the writing of a reflective case study.

She presented a joint paper with Jackie Nicholas at the 29th Annual Conference of the International Group for the Psychology of Mathematics Education in July at the University of Melbourne.

Ms Jackie Nicholas presented a joint paper with Sue Gordon at the 29th Annual Conference of the International Group for the Psychology of Mathematics Education in July at the University of Melbourne.

She attended the half day SUTMEG mathematics education seminars organized by the School of Mathematics and Statistics in December.

She attended the Academic and International Portfolio Horizons Workshop Day: Leading and Managing Change in December.

6.3 Training

Ms Jackie Nicholas attended Fire Warden training.

Ms Catherine Kennedy attended the following University training courses:

Hyperion Financials training
Spendvision Travel training
Fire Warden training
Archibus training.
7 Future Directions

This report has outlined the teaching programs and research activities of the Mathematics Learning Centre in 2005.

The teaching programs represent our on-going commitment to the needs of our diverse student community. The following teaching initiatives are being planned for 2006 and beyond.

- Development of MATH1111, MATH1014 supplementary tutorials to support students in new units of study.
- Development of MATH1015 supplementary tutorial to support students in this statistics unit of study. This initiative is the response to a need identified from our student surveys.
- Use of the Flexsis data base to identify eligible students.
- Continued work on a project with the Faculty of Economics and Business to support their students’ mathematics learning.
- Continued development of the Centre’s web site including making the Centre’s publications available on-line.
- Continued development of a MLC publication on the Normal Distribution.

The following initiatives are being planned to further develop the Centre’s research activities.

- Continued work on a project to explore the ideas of international statistics educators about the teaching and learning of statistics service courses at university. Preparation has commenced on an invited paper for the Seventh International Conference on Teaching Statistics (ICOTS7) to be held in 2006. A journal paper is also in preparation.
- Request to supervise potential doctoral candidate, Ms Jennifer Tindale, Faculty of Education and Social Work. Jen is applying for admission to the University of Sydney in 2006.
- Continued work on a project analysing case studies on university teachers’ perceptions about memorising in teaching and learning mathematics.
- Development of work in the study of anisotropic diffusion. Anisotropic thermal diffusion models for the Earth’s core will be examined in detail to determine the analytic and numeric feasibility of coding linear stability simulations.
- A detailed literature search for benchmark solutions to check anisotropic thermal diffusion models is to be conducted.
8 APPENDIX 1 2005 Student Surveys

During 2005, twelve surveys were conducted by the Centre. A report of seven surveys and the SCEQ is included in this section.

8.1 Bridging course for statistics surveys

This course was introduced in 1988, and is run annually in February. A survey is conducted at the end of the course each year and these surveys are used to further develop and modify the course. Thirty five enrolled in the Bridging Course in 2005. Again in 2005, the students were divided according to their unit of study and two similar parallel courses were taught. These groups will be referred to as the Psychology students and the Introductory Biostatistics students.

The students were asked to give an evaluation of the Bridging Course for Statistics in their last class. Thirty two students returned the survey—fourteen Psychology students and eighteen Introductory Biostatistics students. The students were asked background information, open ended questions and asked to rate the Mathematics/Statistics course they received on a five point scale. A summary of their evaluations appear below.

Table 11: Overall evaluation of the Bridging Course for Statistics 2005: Psychology students

<table>
<thead>
<tr>
<th>Scale</th>
<th>Poor</th>
<th>2</th>
<th>Fair</th>
<th>3</th>
<th>4</th>
<th>Excellent</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count</td>
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<td>1</td>
<td>6</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>%</td>
<td>0%</td>
<td>0%</td>
<td>7.1%</td>
<td>42.9%</td>
<td>50.0%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

N=14

Open ended questions: Psychology students

The best things about the course at the Mathematics Learning Centre were:

Ten students commented on the quality of the workbooks and eight students commented on the high quality teaching as the “best thing about the course”. The following quotes summarise the students’ responses.

- Teachers were very easy to understand and explained things thoroughly.
- I have started to understand some of the concepts that I couldn’t grasp in high school, and also feel a bit more comfortable about basics in stats.
- The booklets were good as they allowed us to work on own our in a group, but at our own speed.
What things didn't work and how could we improve them?

When asked to comment on negative aspects of the course, five students reported that one of the topics was a little rushed and five students thought the course was too short.

- Would have liked to go slower with linear equations or start from the very beginning (but that’s just me). Maybe course could be a bit longer?

Three students commented that more time spent on concepts that would be covered in the unit of study would be beneficial.

- Also perhaps a bit longer on inferential stats as it is quite difficult and a major component in the psych course.

Table 12: Overall evaluation of the Bridging Course for Statistics 2005: Introductory Biostatistics students

<table>
<thead>
<tr>
<th>Scale</th>
<th>Poor</th>
<th>Fair</th>
<th>Excellent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>%</td>
<td>0%</td>
<td>0%</td>
<td>22.2%</td>
</tr>
</tbody>
</table>

N=18

Open ended questions: Introductory Biostatistics students

The best things about the course at the Mathematics Learning Centre were:

Five students commented favourably about booklets used in the course, and five students thought learning to use the calculator properly was the best things about the course. The following quotes summarise the students’ responses.

- Learning to use the calculator properly.
- It covered a lot of material systematically. The booklets were very good.
- The small class size, and the materials were concise and divided really well into topics — plus many concepts such as binomial dist was explained better than when I learned it the first time.

What things didn’t work and how could we improve them?

Two students each commented that the pace was too fast, the classes were too long or that all the harder topics were in the second week.

8.2 Supplementary tutorial surveys

MATH1013 Calculus

This survey was conducted at the end of Semester 2 during a supplementary tutorial for MATH1013 students. Sixteen students returned a survey. The students were asked background information, open ended questions and asked to rate teaching/instruction in the supplementary tutorial and their confidence in learning mathematics as a result of attending the supplementary tutorial on a five point scale.
Table 13: Overall evaluation of the service of the supplementary tutorial for MATH1013 in 2005

As a result of attending the supplementary tutorials my confidence in learning maths has:

<table>
<thead>
<tr>
<th>Scale</th>
<th>Decreased</th>
<th>Stayed the same</th>
<th>Increased</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count</td>
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<td>0</td>
<td>7</td>
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<td>%</td>
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<td>44%</td>
</tr>
<tr>
<td>N</td>
<td>16</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

I would rate the instruction/teaching in the supplementary tutorials:

<table>
<thead>
<tr>
<th>Scale</th>
<th>Poor</th>
<th>Fair</th>
<th>Excellent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count</td>
<td>0</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>%</td>
<td>0%</td>
<td>0%</td>
<td>37.5%</td>
</tr>
<tr>
<td>N=16</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Responses to two open ended questions are summarised here.

The best thing about the supplementary tutorial is:

All the students responded to this question. The following responses represent their views.

- Simplifying university maths and showing the reasons for the equations instead of just solving problems without knowing why.
- Having somewhere to go to ask questions about the problems I have in maths. The supplementary tutorial has given me a better understanding of the problems and helps with the steps that are not done in the maths lectures. It helps filling the blanks on the assumed knowledge for the maths lectures.
- Small group, slow pace, explains things well.

The worst thing about the supplementary tutorial is:

Three students left this blank or responded nothing. The following responses represent the comments made by the remaining students.

- That it’s only held 1 hour per week and we don’t get to cover all of the lecture material.
- A bad time to fit into my timetable.
- It should go over more student questions/problems instead of some set plan. The more difficult tutorial questions aren’t addressed.

PSYC2021

This survey was conducted in a supplementary tutorial at the end of Semester 1. Eleven students returned a survey. The students were asked background information, open ended questions and asked to rate teaching/instruction in the supplementary tutorial on a five point scale.
Table 14: Overall evaluation of the teaching in the supplementary tutorial for PSYC2021 in 2005

I would rate the teaching in the Mathematics Learning Centre statistics tutorials as:

<table>
<thead>
<tr>
<th>Scale</th>
<th>Poor</th>
<th>2</th>
<th>Fair</th>
<th>3</th>
<th>Excellent</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count</td>
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<td>0</td>
<td>1</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>9.1%</td>
<td>90.9%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

N=11

The students were asked to evaluate the supplementary tutorials by commenting on the best things about them, the worst things about them and suggestions for improvement.

Eight students commented on the excellence of the teaching. The following statements taken from the survey encapsulates the range of their responses.

- I really enjoyed the tutorials because information was explained at a good pace and in basic language which is what I need to understand. I feel I have a good conceptual understanding and am less anxious about stats now, compared to the beginning of the year. I have passed everything in stats so far. I don’t believe I could have achieved this without the tutorials. I also like being with other people during the tutorials who are in the same situation as me. It helps me feel less isolated and less intimidated. I don’t have any criticisms—all great.
- Very good, very effective. My tutor is really patient and explains things well. Only bad thing was overcrowding at the beginning of term.
- I improved greatly. I started to enjoy the work because the teacher was very easy to understand and very helpful.

8.3 Drop-in Centre surveys

In 2005, we conducted a survey of the Drop-in Centre in Semester 2. The students were invited by a sign only to participate in the surveys during two weeks at the end of Semester. Forty one students returned a Centre survey. The students were asked to rate the overall service they received from the Centre and whether their confidence in learning mathematics had increased, stayed the same or decreased after attending the Centre. The student were asked a series of open-ended questions about their experience of learning mathematics in the Centre. The results were as follows:

Table 15: Overall evaluation of the service of the Mathematics Learning Centre in Semester 2 2005

<table>
<thead>
<tr>
<th>Scale</th>
<th>Poor</th>
<th>2</th>
<th>Fair</th>
<th>3</th>
<th>4</th>
<th>Excellent</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count</td>
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<td>0</td>
<td>1</td>
<td>17</td>
<td>23</td>
<td></td>
<td></td>
</tr>
<tr>
<td>%</td>
<td>0%</td>
<td>0%</td>
<td>2%</td>
<td>41%</td>
<td>56%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

N = 41
Table 16: Self assessment of confidence in learning mathematics as a result of attending the MLC in Semester 2 2005

<table>
<thead>
<tr>
<th>Scale</th>
<th>Decreased</th>
<th>Stayed the same</th>
<th>Increased</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>%</td>
<td>0%</td>
<td>0%</td>
<td>4%</td>
</tr>
<tr>
<td></td>
<td>24</td>
<td>24</td>
<td>15</td>
</tr>
<tr>
<td>N</td>
<td>41</td>
<td>41</td>
<td>41</td>
</tr>
</tbody>
</table>

Open ended questions:

The best thing about the individual assistance at the MLC was:

Many students singled out the teaching for particular mention. It was described as “friendly and helpful”, “excellent”, and “understandable”. The following statements taken from the survey encapsulates the range of their responses.

- Having things explained to me in layman’s terms or having things explained in a different way if I don’t get it first time. Without the MLC I would have failed my maths units last semester.
- The tutors all gave an in depth and understandable explanation of the topics being studied. This has been extremely helpful, as it has allowed me to fully comprehend the mathematical principles involved in my study.
- I was able to be shown things until I understood them completely. Also, as there were different teachers each time I came in to MLC, I was able to get a different perspective—which really helped me to learn!
- Helping me to identify what it is that holds me back from achieving my best in mathematics.

What things didn't work and how could we improve them:

Twenty-four students left this question blank or commented that they like it the way it was. Seven students identified waiting for assistance during busy periods as a problem, and eight students suggested that two tutors be employed during busy times. The following quotes summarise the students’ responses.

- Maybe more tutors available during the busiest time of semester.
- Keep a better system to work out who is next in the queue to get help.
- No real problems but some of the tutors were able to help more than others.
- Sometimes the length of time needed to wait just to get a 1 minute answer to a question.

8. 4 Mathematics Workshop surveys

Seven mathematics workshops were held in 2005. The workshops were constituted to cover some areas of basic mathematics that were needed in economics and business units of study. A survey was conducted at the end of each workshop. The survey results of the same workshop from each Semester are included here.
Working with Quadratic, Exponential and Logarithmic Graphs Workshop

This workshops was held in Week 3 of both Semesters, and was attended by 15 students in Semester 1 and 25 students in Semester 2.

Table 17: Overall evaluation of the Mathematics Workshop in Semester 1 2005
I would rate this Maths workshop as:

<table>
<thead>
<tr>
<th>Poor</th>
<th>Fair</th>
<th>Excellent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scale</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Count</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>%</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>

N=13

Table 18: Overall evaluation of the Mathematics Workshop in Semester 2 2005
I would rate this Maths workshop as:

<table>
<thead>
<tr>
<th>Poor</th>
<th>Fair</th>
<th>Excellent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scale</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Count</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>%</td>
<td>0%</td>
<td>6%</td>
</tr>
</tbody>
</table>

N=18

The students were asked to respond to the following open-ended questions. The following quotes summarise the students’ responses.

The best things about this Maths workshop were:

Semester 1

• Covered basics for use for units needing this basic knowledge. Notes are really helpful too.
• Helped to jog my memory of maths that I have not used for a long time.
• Lots of egs, clear explanation, solutions to egs.

Semester 2

• Nice teacher.
• Good general coverage of topics, useful handout notes.
• Refresher course helped with basic understanding of concepts often used.

What things didn't work and how could we improve them?

Semester 1

Eight students left this blank. Other responses include:

• More specific
• Online quizzes please (since implemented)
• Add some statistics courses
Semester 2

Fourteen students left this blank. Other responses include:

- Examples were too easy, should have started with easy, then gone on to harder questions.
- A lot of material was covered in a short period of time. Maybe the notes could be put up before the workshop (since implemented).
- Arrange timetable so that students could attend to avoid conflicting with other courses.

Are there any other comments you would like to make?

Semester 1

Eight students left this blank. Other responses include:

- Great opportunity to learn maths for course and refresh memory to prepare for course.
- Good to see this program is up and running for people who are not as up to scratch with maths as others. Program should be kept running.
- Nice teacher. I didn’t feel intimidated when taking part.

Semester 2

Fifteen students left this blank. Other responses include:

- Very good.
- Enjoyed workshop.
- Put more time on logarithmic functions because it is the most difficult one among those which are included in this maths workshop. (since implemented)

8. 5 2005 SCEQ undergraduate student survey

In 2005, the Institute of Teaching and Learning carried out a Student Course Experience Questionnaire (SCEQ) survey of undergraduate students. The survey sought feedback from students on their experiences of student support and administrative services as well as University teaching. Questions about the Mathematics Learning Centre were included in this survey. The results of the survey question are given below together with comparative data from previous surveys. The SCEQ was not conducted in 2004.

SCEQ 2005 Undergraduate Survey – Mathematics Learning Centre question

Table 19: SCEQ responses of undergraduate students in all years and commencing first year students on the quality of MLC service in 2005

<table>
<thead>
<tr>
<th></th>
<th>All Years</th>
<th></th>
<th>Commencing 1st Year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N=118</td>
<td>Responses</td>
<td>Students N=50</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
</tr>
<tr>
<td>Excellent</td>
<td>19</td>
<td>16.1</td>
<td>11</td>
</tr>
<tr>
<td>Good</td>
<td>56</td>
<td>47.5</td>
<td>20</td>
</tr>
<tr>
<td>Average</td>
<td>29</td>
<td>24.6</td>
<td>14</td>
</tr>
<tr>
<td>Poor</td>
<td>9</td>
<td>7.6</td>
<td>4</td>
</tr>
<tr>
<td>Very Poor</td>
<td>5</td>
<td>4.2</td>
<td>1</td>
</tr>
</tbody>
</table>
An examination was conducted of the students’ responses from the College of Science and Technology (CST) as about 58% of the Centre’s registered students are enrolled in CST.

Table 20: SCEQ responses of undergraduate students in all years and commencing first year undergraduate students from CST on the quality of MLC service in 2005

The quality of the service was:

<table>
<thead>
<tr>
<th>All Years</th>
<th>Responses</th>
<th>Commencing 1st Year Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>N = 80 (out of 1329)</td>
<td></td>
<td>N = 37 (out of 354)</td>
</tr>
<tr>
<td>N</td>
<td>%</td>
<td>N</td>
</tr>
<tr>
<td>13</td>
<td>16.3</td>
<td>Excellent</td>
</tr>
<tr>
<td>35</td>
<td>43.8</td>
<td>Good</td>
</tr>
<tr>
<td>23</td>
<td>28.8</td>
<td>Average</td>
</tr>
<tr>
<td>6</td>
<td>7.5</td>
<td>Poor</td>
</tr>
<tr>
<td>3</td>
<td>3.8</td>
<td>Very Poor</td>
</tr>
</tbody>
</table>

Figure 2: SCEQ mean scores of all undergraduates and commencing first year undergraduate students on the quality of MLC service for the years 2000 to 2005

Mean scores calculated for each year
Scored as follows:
Excellent = 100
Good = 50
Average = 0
Poor = –50
Very poor = –100

Figure 3: SCEQ mean scores for all undergraduate and all commencing first year undergraduate students from CST on the quality of MLC service for the years 2000 to 2005

Mean scores calculated for each year
Scored as follows:
Excellent = 100
Good = 50
Average = 0
Poor = –50
Very poor = –100
Students were invited to comment on student administration and student support services as a part of this survey. The questions and responses relevant to the Mathematics Learning Centre were as follows.

**Best aspects of student administration and student support services**

- Maths Learning Workshop is fantastic. More staff may be considered however it is a great resource.-Agriculture
- The maths learning centre is a invaluable free resource!!-Economics and Business/Law
- the staff at the MLC are fantastic.-Education and Social Work
- Mathematics Learning centre is excellent at giving assistance to students.-Science
- Services such as the mathematics learning centre have been helpful when assignments expose areas of knowledge that are lacking and need work. -Science
- The Mathematics Learning centre is great as I have not study Maths in over 10 years, I would be lost without it.-Science

**Aspects of student administration and student support services in need of improvement**

- Also students should be able to go to the Maths Learning Centre even without completing 2 unit maths.-Agriculture
- The maths learning centre discriminates against those who have some mathematical background. By all means give priority to those without such a background but refusing to help a student because they did advanced maths in school is ridiculous considering virtually everything covered in the uni course was new and entirely different to the school course. I found this extremely frustrating because there was only 3 other students in the room and giving help to me would not have in any way disadvantaged those other students.-Arts/Science
- Mathematics Learning Centre could be better staffed during peak periods.-Arts/Science
- Staff at the maths learning centre are often not familiar with the specific methods required to solve problems in the various statistics subjects - sometimes this can be more confusing than helpful!!-Economics and Business/Law
- I didn't know there was a learning centre - what is it? I would have used the Maths Learning Centre but they wouldn't let me because I did third year Statistics and they only help people who do introductory stats.-Education and Social Work
- Maths Learning Centre extend its opening hours and service to students beyond first year students - Engineering
- Maths centre limited to particular students daily.-Engineering/Science
- Perhaps opening the MLC (Maths Learning Centre) to more people who need help. Sometimes 1 question answered will make the difference from passing/failing a subject.-Science
- More staff needed during peak usage (i.e. Maths Centre) but the staff that were there were very helpful.-Science
- the mathematics learning centre was useless, i tried to use the service but it was not open, then when i went it wasn't much use anyway. -Science (International student)

The comments about the best aspects correspond to those in our internal surveys. For aspects that were in need of improvement, six out of ten students responded negatively about our eligibility criteria and two students commented about the need for more staff during peak periods.

**8.6 2005 SCEQ postgraduate coursework student survey**

In 2005, the Institute of Teaching and Learning carried out a Student Course Experience Questionnaire survey of postgraduate coursework students. A question about the Mathematics
Learning Centre was included in this survey. The Mathematics Learning Centre has a limited number of postgraduate coursework students. As the majority of our postgraduate coursework students are enrolled in the College of Health Sciences (CHS), data for CHS students is included. The SCEQ was not conducted in 2004.

Table 21: SCEQ responses of all postgraduate coursework students and all CHS postgraduate coursework students on the quality of MLC service in 2005

The quality of the service was:

<table>
<thead>
<tr>
<th>All postgraduate coursework students N=41</th>
<th>Responses</th>
<th>All CHS postgraduate coursework students N=25</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>39.0</td>
<td>Excellent</td>
</tr>
<tr>
<td>15</td>
<td>36.6</td>
<td>Good</td>
</tr>
<tr>
<td>7</td>
<td>17.1</td>
<td>Average</td>
</tr>
<tr>
<td>0</td>
<td>0.0</td>
<td>Poor</td>
</tr>
<tr>
<td>3</td>
<td>7.3</td>
<td>Very Poor</td>
</tr>
</tbody>
</table>

Figure 4: SCEQ mean scores of all postgraduate coursework students and all CHS postgraduate coursework students on the quality of MLC service for the years 2001 to 2005

Mean scores calculated for each year

Scored as follows:

- Excellent = 100
- Good = 50
- Average = 0
- Poor = −50
- Very poor = −100

Best aspects of student administration and student support services

- Maths learning centre was the only reason I passed stats! They were great. Makes life easier having services within easy reach, less running around. -Science
- Usually helpful and approachable. Without the Mathematics Learning Centre I don't think I would have passed a subject last semester! -Medicine
- Maths learning centre was invaluable for someone like me who hasn't done maths for 15 years! They were also very supportive. -Science
- MLC great. -Medicine
- The services I found most useful for me are math learning and learning centres. the Learning Centres provide services that I really need for my degree course. -Medicine (International student)