The Auckland Mathematical Association & The Department of Mathematics	THE UNIVERSITY OF AUCKLAND FACULTY OF SCIENCE

MATHEMATICS WITH CALCULUS

WHEN: Friday, 1 December 2006 **TIME:** 8:45am – 3:15pm	**WHERE:** The University of Auckland, Tamaki Campus, Glen Innes, Room 733-201 **PARKING**: Use Student Car Park (Northern entrance).

8:45am	**Registration** (732.201)
9:00am	**Welcome** (732.201) **:** Bill Barton, HOD, Department of Mathematics, UoA **Plenary :** Dr Philip Sharp, Senior Lecturer, UoA - *'Calculus and Lunar Landing*'
10:05 am	**Workshop 1 D**(731.203), **E**(733.231), **I**(733.234), **H**(721.134), **K**(732.201)
10:50am	*Morning Tea* (721.231& 721.234)
11:10am	**Workshop 2 A**(731.203), **B**(733.231), **C**(733.234), **F**(732.201), **J**(734.203)
12:00pm	**Workshop 3 D**(731.203), **E(**733.231), **G**(733.234), **L**(721.131), **M**(732.201)
12:45pm	*Lunch* (721.231& 721.234)

1:30pm – 3:15pm	**Plenary:**
	Dr Colin Fox, Senior Lecturer, UoA - *'Views of a Mathematical Blob'*
	
	followed by two short presentations:
	1) Catherine Udy - Bothwell, HOD Mathematics Rangitoto College
	   'The Consistency Review and the future direction of Calculus'
	2) Dr Piaras Kelly, Senior Lecturer, UoA
	   'Mathematics in Engineering Science'

Workshops:

A) Rory Barrett, HOD Mathematics, Macleans College
   'The Cambridge Examinations and Resources for Scholarship'
B) Margaret de Boer, Royal Society Fellow, Tamaki College
   'Cycling Networks'
C) Assoc-Prof Paul Bonnington, UoA
   'Lecture recording with Tablet technology'
D) Denise Edwards, HOD Mathematics, Selwyn College
   'Hands-on with the CAS calculators'
E) Hugh Gribben, UoA
   'Conic Sections and Origami'
F) Bea Hugill and Pablo Garcia, Manzana
   'Smartboards and how Class Response Solutions support formative assessment'
G) Dr Alastair McNaughton, Senior Tutor UoA
   'Conic Sections'
H) Greg Oates, Senior Tutor UoA
   'Web-based free software resources for Trigonometry'
I) Judy Patterson, UoA
   'Misconceptions in Mathematics'
J) Dr Alan del Santos, UoA
   'Understanding Students' Understanding: Their Conception and Representation of Derivative'
K) Gerri Shorter and Vicky Bidewell, St Cuthbert's College
   'Calculus using the Smartboard'
L) Dr Steve Taylor, Senior Lecturer UoA, & Anita Kean, Tutor, UoA
   'Exploring some free mathematics software'
M) Catherine Udy-Bothwell, HOD Mathematics, Rangitoto College
   'Activities for Algebra and Complex Numbers'

ABSTRACTS

• Plenary:

Calculus and Lunar Landing
Dr Philip Sharp

In 1975 Hewlett-Packard copyrighted a program known as the Moon Landing Simulator. Each simulation began with the spacecraft 500 feet above the lunar surface and 120 units of fuel for the landing rockets. The aim was to gently touch down on the moon.

The game was intended as a simple and enjoyable game but, like the best of simple games, its educational value is far deeper than first appearances suggest. I will describe and illustrate how the game can be used to teach analytical and numerical calculus to senior high school students.

• Plenary:

Views of a Mathematical Blob
Dr Colin Fox

Applications have long been a motivation for new ideas and discoveries in Mathematics. I put this down to Nature being a hard task master that demands that the Mathematics conforms to it, rather than coming from the mathematician's comfort zone. And so it has been in a recent inverse problem that I have been developing for an industrial application. Such inverse problems already live at that junction of Statistics, Computing, and Physics that we call Applied Mathematics. A key component in inverse problems is the representation of unknowns – in this case a 'blob' in physical space about 0.1 mm across. For such a small thing I have been forced to call on disparate areas of higher mathematics, from projective geometry to number theory, and to invent some new algebraic structures. The precision afforded by these mathematical ideas is critical in simplifying the massive computing job that makes up the majority of the application. I will give a tour around this mathematical object, viewed from different mathematical perspectives. In microcosm this example shows the mathematician's playing field, and aesthetic.

The Department of Mathematics has a website for teachers for teaching resources and other relevant items. Please refer to:

http://www.math.auckland.ac.nz/