Simply the best

Mathematics may be the unsung hero of the modern world, but not at Victoria.

From the ‘rather modest research environment ’ Professor Rod Downey found when he arrived in New Zealand 27 years ago, when he arrived as a `lowly lecturer’’, Victoria has developed world-class capability in mathematics. This includes the mathematical logic group to which Rod belongs, which easily ranks in the top five in the world.

In the last year alone, Victoria mathematicians have received four Marsden research grants, a prestigious Rutherford Discovery Fellowship to Dillon Mayhew, the New Zealand Association of Scientists 2013 Research Medal to Noam Greenberg, and, most recently, the 2014 Nerode Prize, awarded to Rod as co-author of a paper in multivariate algorithmics and complexity.

In addition, the logic and discrete mathematics group includes Professor Rob Goldblatt, the recipient of the 2012 Jones Medal for lifetime achievement in mathematics, the country’s highest mathematics award, and Professor Geoff Whittle who is part of a team which recently solved the 40-year-old puzzle known as Rota’s Conjecture.

This is part of more than a decade of continuous achievement for the programme that includes numerous Marsden Grants and international grants, the RSNZ Hector Medal and the Association for Symbolic Logic Shoenfield Prize (Downey), an international Templeton grants and RSNZ Hamilton Award (Greenberg), RSNZ Hatherton Awards (for best paper from a PhD in NZ) to four ex-PhD students, and Adam Day, recently added to the VUW faculty, winning the Sacks Prize for the best PhD in Logic worldwide, and then becoming the first New Zealander to become a Miller Fellow at UC Berkeley, before returning to VUW. The group is constantly sought after for plenary addresses at major international conferences; Professor Downey being the first New Zealand based mathematician to give an invited lecture at the International congress of mathematicians, and still one of only three.

The success is no accident says Dr Peter Donelan, Head of the School of Mathematics, Statistics and Operations Research.

“Our strategy has been to hire the best people, those who are outstanding mathematicians regardless of the area they work in. That has led to a really strong capability in pure Maths, with a particular strength in logic.”

The group has also focused on attracting and retaining mathematicians at different stages of their career as Denis Hirschfeldt, a former postdoctoral fellow at Victoria and now a professor at the University of Chicago, explains.

“Rod Downey, (Associate Professor) Noam Greenberg and (Dr) Adam Day are each among the very best computational theorists of their respective generations. Having three researchers of that level in the same group is an extraordinary achievement, equalled only by two or three other institutions in the world.”

The Marsden Fund has also helped, says Peter, providing a source of support for blue skies mathematical research since its introduction in 1994. The group has had continuous support from the Marsden Fund since its inception.

Despite the subject often being seen as abstract and complex, Rod says we live in the age of mathematics.

That is partly because mathematical logic underpins modern computing, providing the ability to solve problems which came to a halt in the early part of the 20th century because, says Rod, “it would have taken a lifetime to do the next level of calculations.”

“Almost every electronic device we use fundamentally employs mathematics to make it work. Almost every advance in science from biology to physics to archaeology intrinsically uses modern mathematics as a tool.”

That, in turn, has enabled technological advances, ranging from automatic washing machines and Google search systems to smart phones and secure banking. With recent appointments in engineering mathematics, VUW does have matematicians working on problems such as making corn flakes crispier (Dr McGuinness) and modelling Tsunami waves. Work from the group which did not anticipate applications, and for which the Nerode Prize was awarded, has turned out to have applications in computational biology, voting modelling, and artificial intelligence, and many other areas.

However, as Peter says, “While applications are undoubtedly important and provide rich motivation for many of us in our research, the beauty of the subject remains highly prized by mathematicians at Victoria”.

Rod agrees, “Who knows what is going to turn out to be useful in Maths? Famously, the great English mathematician G. H. Hardy claimed with pride that nothing he did would ever be useful. The number theory Hardy developed is now central in the security of modern banking.”

Carrying out leading-edge research will always be a focus at Victoria, so encouraging the next generation of mathematicians is also high on the agenda.

“There are post-doctoral fellows who have studied at Victoria scattered around the world’s top mathematics schools. I think we are known for providing a great research atmosphere and very effective mentoring and we’re really keen to bring more international postgraduate students here to benefit from that, as well as continuing to foster the great talent among our own graduates” says Peter.

The many talents of mathematicians

Victoria mathematicians provide living proof of the interaction of Mathematics and the Arts. Dr Dillon Mayhew, recent recipient of one of the Rutherford Discovery Fellowship awarded to emerging scientific leaders, is also an accomplished French Horn player. Australian-born Rod Downey splits his time between computation and complexity theory, composing and performing Scottish country dance (and surfing!), while Peter Donelan is co-supervising a PhD student exploring the links between mathematics and poetry.

Find out more about Rod's work here:
www.mathsreach.org/Complexity,_Computation_and_a_bit_of_Fuzzy_Logic