

DES News

Department of Engineering Science

June 2011 | Alumni and Friends quarterly newsletter | Number 11

Dear Alumni and Friends

This issue reports on a significant change of staff. After 30 years of service to the department, Ian Collins is retiring on July 5th. The department will be different without him, and he will be missed.

Our students have been very active not only in their studies, but also with social activities, organising an inaugural coast to coast relay race and the third annual bake-off competition.

There is sad news also, with Andrew Pullan's diagnosis of cancer (see below). Please enjoy the newsletter and support the trust for Andrew's treatment.

Professor Matthias Ehr Gott, Head of Department
hod_des@auckland.ac.nz

Farewell to Ian Collins.



There have been a series of farewells to Ian Collins as he approaches retirement, including a lunch with students at de Post, shared cake from DES and baked goodies from the students at the conclusion of his last lecture, and a Faculty of Engineering lunch where staff from DES and across Engineering met to officially farewell Ian.

Speeches were made at the latter by Michael Davies (Dean of Engineering), Matthias Ehr Gott, and Ian himself (abridged version of Ian's speech on page 3). Special guests included founding DES member Mervyn Rosser, past Deans of Engineering Ray Meyer and Peter Brothers, as well as Ian's wife, Weijun, Weijun's daughter Enya, and Ian's daughter Helen and grandson Geno.

SEE PAGES 2 AND 3 FOR MORE ON IAN

To Andrew Pullan's friends and colleagues,

I am writing as Acting HOD of DES, and as a friend of Andrew Pullan's. I want to make you aware of Andrew's current state of health and offer a suggestion to help him and his family. In Andrew's own words:

"As some of you know I began feeling unwell since returning from my recent trip overseas. I have had a number of tests and I have been diagnosed with metastatic melanoma. The primary/originating site of this cancer has not been found, but they suspect it could well be internal, as I have a polyp in my stomach and no obvious signs anywhere on my skin. The melanoma has spread to my liver and my lungs, and I have nodes in my neck. It was likely developing within me before it appeared on my neck so there was absolutely nothing I could have done to have had it detected before it spread internally."

Andrew is in contact with specialists at both Oxford University and the Mayo Clinic. He tells us that:

"There is a high level of optimism that I can be successfully treated as there have been some very recent significant breakthroughs in the treatment of this cancer."

Right now Andrew is awaiting genetic testing results that will outline the path forward. His treatment is likely to involve recently developed drugs which are not available in NZ. At this stage Andrew does not know where he will need to travel to access these medications or what they will cost. Andrew notes:

"Assuming cost hurdles can be overcome, there is not a single doubt in my mind that I can be returned to full health. I am also confident that I can be kept that way for many years to come."

I spoke to Andrew recently. He is as upbeat as one could expect given what he faces, and is preparing himself for what will be an arduous journey. He is already planning his "Come Back Lecture" at the University. Andrew welcomes and appreciates emails and phone calls etc. However be aware that Andrew gets very tired and may not be able to respond to every message of support.

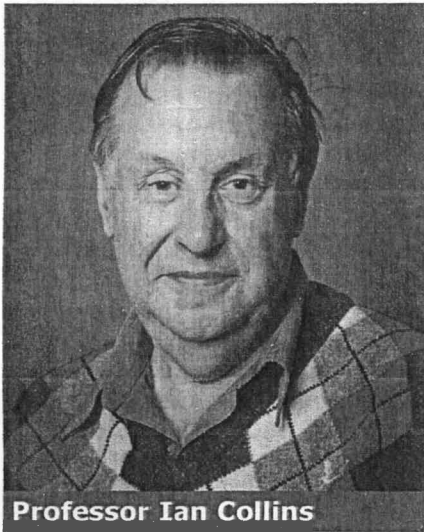
Colleagues in DES are founding a trust fund to support Andrew and his family through this. The cost implications of potential treatments are significant so we'd like try to ease that burden. The trust formation is being led by Professor David Ryan, with Professors Andy Philpott and Mike O'Sullivan and Associate Professor Rosalind Archer as trustees. If you wish to contribute funds, deposits can be made into a trust account operated by the Duthie Whyte law firm (a/c 12 3011 0504793 05). Please note in the reference field of your deposit that the funds are for the "Pullan Trust". Use of Duthie Whyte's account is an interim measure until an account can be opened at a local bank. Online donations are possible via <http://www.givealittle.co.nz/cause/AndrewPullan>. Donations at this site are via credit card which does attract a small service fee. Online contributions can be made anonymously if donors wish to do so.

Andrew knows he has a big team of people on his side. That support (in every possible way) means a great deal to him and his family. Andrew has started a **blog** to keep everyone updated on his progress.

Associate Professor Rosalind Archer

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Professor Ian Collins

from the RSNZ website

Professor Ian F. Collins, Department of Engineering Science, University of Auckland, has distinguished himself in the areas of mechanical engineering and applied mathematics, with contributions in solid mechanics and thermo-mechanics, and their applications to aspects of glaciology, metal-forming, friction and wear, structural mechanics, composite materials, geomechanics and geotechnical engineering. He has developed rigorous models of engineering processes which are also workable from an engineering perspective.

Ian Collins is one of the world's foremost experts on fundamental plasticity theory and its application to mechanical and geotechnical problems. As an international expert on geomaterials he has applied the basic laws of thermodynamics to develop a completely new procedure for developing constitutive models for soils, sand, and other geomaterials. His pioneering work on the application of "shakedown theory" to predict the performance of layered road pavements has been taken up by engineering groups in the United Kingdom and Australia. He is a profoundly original thinker whose work pushes the subject in a new direction.

The following year brought the bane of every student's existence: Einstein and vector notation, attended to in a rigorous manner. Although it took several tutorials, Ian Collins was very happy to take the time to make sure that we understood what was happening. Despite all the Greek letters looking like variations on a squiggle, and suspiciously similar *m*'s and *n*'s, Ian's classes built a reputation for his teaching interesting, if not exactly easy, material.

I was fortunate enough to be able to work with Ian Collins as a summer student and as a Part IV project student. Although both projects were challenging, I found them to be highly rewarding experiences because Ian provided a lot of support and encouragement (and plenty of reading!). One thing I particularly enjoyed; when we weren't talking about thermodynamics or sand, we had many stimulating conversations, from holidays to politics to cosmology.

Ian's concern for his students and his willingness to spend time to make sure that people weren't falling behind has created a great deal of respect for Ian, and he will be missed when he retires. It is a testament to his popularity with the student body of Engineering Science that he has a **Facebook fan page** with over 175 fans. I know that I have benefitted a great deal from being fortunate enough to have had him as a lecturer, supervisor and friend, and I wish him all the best for a relaxing and exam-free retirement.

Speaking of and to Ian

from Andrew Pullan (Colleague and Ian's first PhD student)

For the majority of the people that have come through the Department of Engineering Science (formerly TAM), Ian Collins has always been around. But soon he won't be, as he formally retires on July 5th. It is hard to imagine the Department without Ian – it certainly won't be the same for either the staff or the students.

Ian's biography has appeared in a few articles in recent times (e.g. in an earlier version of this newsletter celebrating his 70th birthday, and the history book of the Department). The short facts are that Ian came from the UK in 1980 to take up the Headship of the Department, and he remained in that position for 10 years. He then served as the Associate Dean of Research in the Faculty of Engineering for the next decade, all the time continuing to conduct research and teach students. He is a world renowned authority in the field of solids mechanics and has received numerous awards for this. In recent years, Ian has given teaching his top priority, and his various lectures on mathematical modeling and continuum mechanics have been extremely well received. I know this to be a fact because the students themselves started a **Facebook page** in his honour (something that Ian was not aware of for quite some time). On that Facebook page you can find statements, posted by some of his students, that read

"He is the epitome of Professor"

"Ian Collins' word is LAW!!"

"Ian Collins THE MAN"

"If Ian Collins died, the world's average IQ would drop by an integer"... luckily he's immortal"

Ian has worked hard with many students to help them achieve to the best of their potential. This includes not only some of our best and brightest, but also students across the entire academic spectrum. There have been a number of students over the years that simply would not have completed their project or coursework without Ian's extra help and care, and I know Ian is very proud of these achievements. Ian also has a special love, and skill, at growing orchids and occasionally some of these lovely specimens have graced the offices in the Department.

Ian will be missed around the Department. I, for one, have always valued his insight and perception, and in the last few years, his support and understanding, as I took on the role of Department Head.

Enjoy the Orchids Ian.

from Christopher Vogel (one of Ian's last PIV Project students)

Having braved the bowels of the Arts Department, I remember the first lecture of ENGSCI 263 with Professor Collins, where we explored why golf balls have dimples. It was clear from the outset that his lectures were going to be something different. Over the course of the semester we covered a wide range of useful topics, such as where to stand when someone is firing a cannon at you, how much insulation you should put around a hot water cylinder, and chaos.

Ian Collins' farewell speech* (abridged)

Upon graduating, from King's college Cambridge, with a degree in applied mathematics, I gained employment at the Admiralty Research Laboratory near London. I found that I was the only person with a mathematics background. The others were all engineers, and the project was the improvement of propeller design procedures for torpedoes and submarines. However I soon discovered that a mathematical background was a big advantage when it comes to developing new engineering procedures, and as a result I developed a life-long interest in the applications of mathematics to various aspects of Engineering. After 3 years I returned to Cambridge to undertake PhD research into the mechanics of the deformation of hot metals and ice.

It was a problem that proved difficult, until I suddenly realised (as I got on a bus on the way home to my parents for Christmas) that the problem should be viewed as one of algebra, not calculus. This proved to be a breakthrough and enabled us to solve a number of new problems. It was the first of just two good ideas I had in the 40 years of my research career. I later made a trip to Japan, where I was pleasantly surprised to have my name recognised by engineers there, and to be told that they were using my paper to design their metal presses.

After my PhD, I became a lecturer at Manchester University, staying there for eleven years. During that time, I met Cecil Segedin - I was organiser for a conference that he attended - and learnt about the TAM department in Auckland of which Cecil was the founding head. Two years later I applied for the position as his replacement, and was fortunate enough to be appointed.

This was in 1981, and I was Head of Department for ten years. My strongest memory from that time is sadly a tragic one; the discovery that Associate Professor Medland was seriously ill with a hereditary form of Alzheimer's. To this day, I very much regret not having had the opportunity to know him earlier, before the onset of his disease.

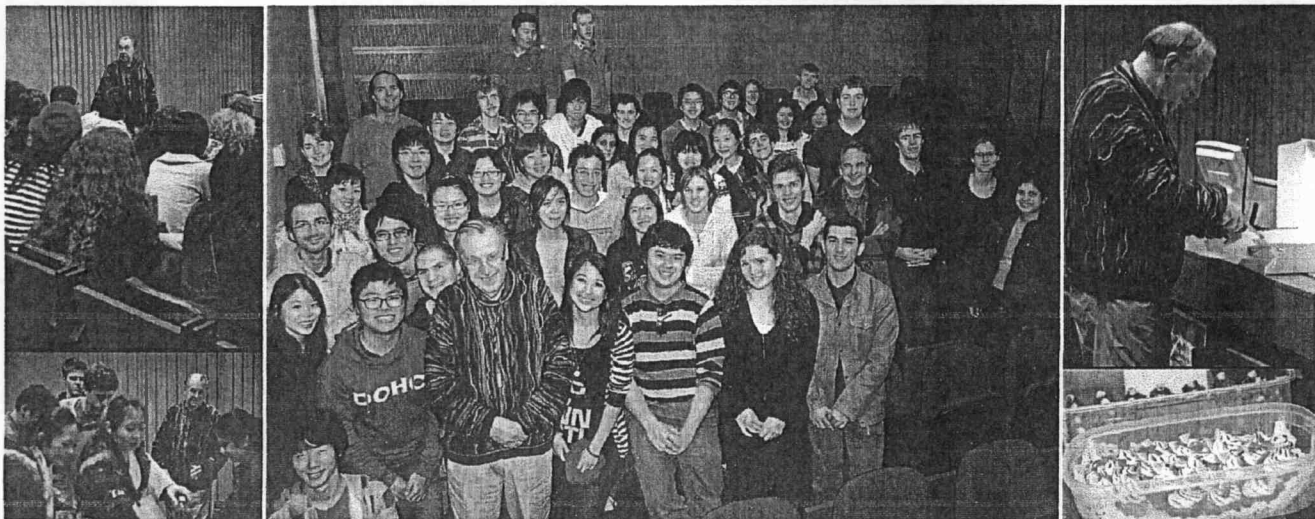
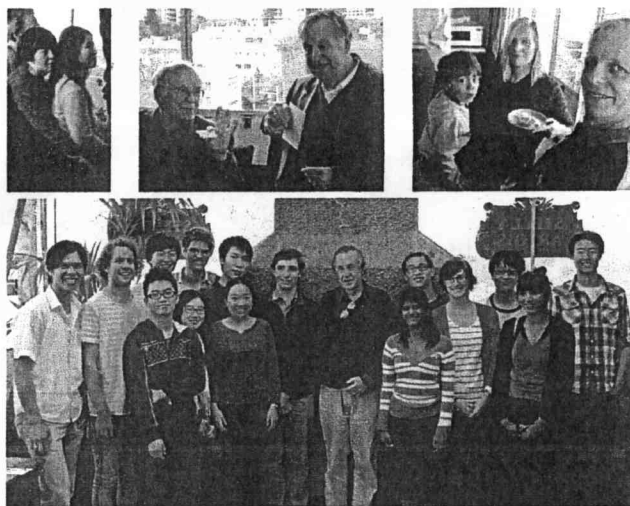
In 1993, as the university was moving towards more of a research base, the then new dean, Roy Sharp, asked me to be the foundation Associate Dean for Research, and Postgraduate Students. The international portfolio was later added to this. Although this meant that my research program had to be put on hold again, I welcomed the opportunity to get involved in the larger scale School and University activities. I spent 10 years as an associate Dean of some sort or other. I did manage to get a research program going looking at problems of pavement design, and applying ideas from thermodynamics to the modelling the behaviour of geomaterials (sand, clay etc). An aspect of my time as an academic at Auckland which I particularly enjoyed was the

variety of responsibilities that were required, and with the opportunities to focus on administration, research and teaching.

The second of my two "good ideas" came in 1996, when I was on leave in Oxford. I was fortunate to have a very generous research fellowship at Christ Church, and was hosted in the engineering department, which was short of space. The only place I could be fitted was in Professor Guy Holsby's office, squeezed in at a separate desk. Despite this inauspicious start, we soon found that our knowledge and abilities were complementary and we fitted together as team very well. We both regard this as being the most effective collaboration of our careers. It produced a major Royal Society publication on the fundamental thermomechanics of geomaterials. This paper now has well over 100 citations (ie the work is quoted in the publications of over 100 other researchers).

I have much affection for this 12th floor room we are in now. In the early days I had many very useful discussions with colleagues from other departments, many of which led to publications. We have had a succession of "tea ladies" looking after us. Sandra is always ready with a cheery greeting or joke, which sets one up for the day - even when the coffee doesn't. The most famous of them is, of course Nell, who had her own network of information in the University and we received the latest news, well ahead of any official announcement. Once whilst on leave I sent a postcard, addressed to the "Associate Dean for Information Transfer"- Nell was delighted with the promotion.

In conclusion, I wish to thank people for their friendship over all the last 30 years. I have never regretted the decision to come here. I wish you all well for the future.



Top photo band, left to right: Wejun Collins and daughter Enya Chadderton; Ray Meyer and Ian Collins; Geno Collins, Helen Collins, Andrew Pullan

Middle photo: Students with Ian Collins at de Post in Mt Eden

Bottom photo band: Ian Collins' last lecture

*From the Faculty of Engineering farewell lunch

Autumn Graduation 2011

Announcing DES' most recent graduates, as of May 2nd:

Doctor of Philosophy in Engineering Science

Anthony Downward (featured far right)

Eylem Kaya (featured on page 6)

Juliet Newson (featured on page 6)

Master of Engineering in Engineering Science

Charles Moliere

Emily Clearwater

Gary Nates

Michael Byrne



Left to right: Eylem Kaya, supervisor Mike O'Sullivan, Juliet Newson, Emily Clearwater

Bachelor of Engineering in Biomedical Engineering

Mihailo Azhar

Ana Basabas

Ming Cen

Chun-Mi Chen

Vee Ken Kevin Cheong

Michelle Deacon

Linda Ye Lin Feng

Emily Hargrave-Thomas

Ping Lee

Jee Lean Lim

Wei Liu

Aswin Narayanan

Tessa Paris

Rebecca Pullon

Nicholas Stringer

Gary Tao

Prathibha Wickramaratna

Bachelor of Engineering in Engineering Science

Oliver Browne

Angela Buckland

Henry Chih-Han Chueh

Matthew Clark

Allen Crimmins

Scott Dakers

Iain Dunning

Chung (Dominic) Fok

Jerry Shih-Yao Gao

Kuan-Min Lin

Hsin Hui Lin

Antony Phillips

Harriet Priddey

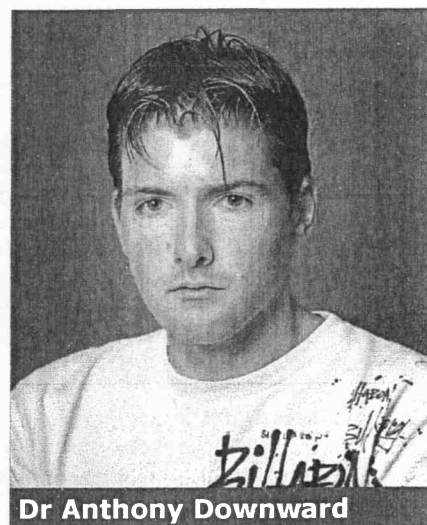
Yu Feng Qiao

Catherine Roberts

Laura Tosio

Christopher Vogel

Yiqi Zhou



Dr Anthony Downward

"Impact of Transmission on Strategic Behaviour in Electricity Markets"

Abstract:

We investigate the impact of transmission on the strategic behaviour of firms competing in deregulated wholesale electricity markets. Assuming uniform-price auctions and locational marginal pricing, we investigate the properties of the dispatch problem over networks that are constrained and/or lossy. Without loops and losses we derive important results as to how price varies as a function of demand at each node. Whereas, for networks with loops and losses, we discuss the non-convexity of the dispatch problem and show that the optimal value function may be non-convex.

We model the strategic firms as Cournot agents, and discuss how the assumptions surrounding the rationality of the agents can influence the equilibrium outcomes. Under a full-rationality assumption, we introduce the concept of candidate equilibria and examine the conditions on the parameters of the network that ensure that these are indeed valid equilibria to the Cournot game.

Post thesis:

Since submitting my thesis, I have continued on with my energy research, doing a postdoc with DES and the Energy Centre. Over the next year I will be involved in a number of projects, including an analysis of the effect of risk-aversion of retail pricing, and the addition of hydrology to an agent-based model of wholesale electricity markets.

Student wins prestigious international scholarship



Part IV EngSci student Samuel Cheng is one of three students to receive a Society of Petroleum Engineers (SPE) Southern Asia Pacific Region Star Scholarship, and is the only New Zealander to be awarded the scholarship this year.

The committee considered many aspects including academic records, leadership and communication skills, interest in petroleum engineering as a profession, and contributions to the SPE in order to award the scholarship.

FOR MORE...

BME and EngSci Careers Evenings, 2011

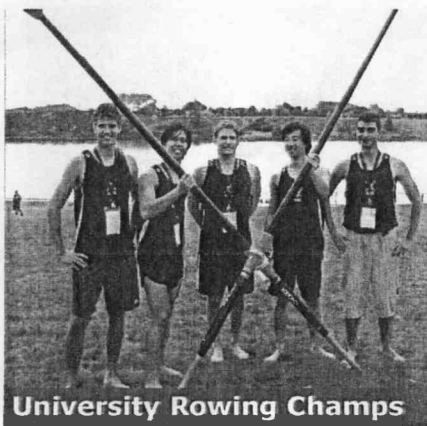
Every year, we run two careers evenings – one each for BME and EngSci undergraduates. These evenings consist of a series of presentations by interested companies, and are primarily for final year undergraduate students. Postgraduate students often attend as well, as do second and third year undergraduates who are planning ahead or looking ahead for summer work.

Each company gives a short presentation, then opens the floor for questions. There are refreshments at the end of the evening, which give the company representatives and students the opportunity to meet and talk with each other.

This years companies were: Industrial Research Limited, Fisher & Paykel Healthcare, Medtronic, Locus Research, Orion Health, and Plant and Food Research on the BME evening; Beca Applied Technologies, Beca Transportation, Contact Energy, Transpower, Derceto, Fonterra, Opus, Traffic Design Group, and Sinclair Knight Merz on the EngSci evening.

If you work for or know of, a company that might be interested in presenting at either evening next year, please contact **Andrew Mason** (EngSci) or **David Long** (BME).





University Rowing Champs

by Christopher Rolls

Our department was well represented at the April 23rd University Rowing Champs held at Lake Karapiro, with four undergrads, one masters, and one PhD student competing. All six DES competitors achieved medals.

The department was most heavily represented in the beginners categories, with undergrads Denis Helm, Damjan Stefkov and Jason Udan all trying rowing for the first time - their coach, fellow undergrad Chris Rolls. Forming a team of four with the addition of Denis's brother Michael, they won a silver medal in the Men's Novice 4, and narrowly missed out on a bronze medal in the Men's Tournament 4, placing fourth. Also competing in the Men's Tournament 4 was Masters student John Park, whose team won the silver. John, Denis, Damjan and Jason joined four others to win a second silver medal in the Men's Tournament 8.

PhD student Ellyce Stehlin was the star DES performer of the day, her team placing 2nd in both the prestigious Women's Champ 8 and Women's Intermediate 8. Despite a personally disappointing performance - winning a single silver medal - Chris Rolls was selected for the New Zealand University Men's Lightweight 4 to race in a trans-tasman test series against Australia in July.

The next university rowing regatta is the North Island Tertiary Challenge held in mid-August and is open to both staff and students. If you would like to give it a go or get back into rowing email aubcnz@gmail.com

Photo at top - left to right: Denis Helm, Jason Udan, Michael Helm, John Parks, Damjan Stefkov

Inaugural Coast 2 Coast Relay

by Jonathan Munden (Part IV Engineering Science)

This year we held the inaugural Engineering Science Coast 2 Coast Relay Race across Auckland City. We had 11 teams enter from each undergraduate level in both Engineering Science and Biomedical Engineering, as well as staff and postgraduate teams. We also had two brave entries from individuals. Each team consisted of 4 members, each running 4km each. The Relay began at Onehunga Bay and finished at the waterfront on Tamaki Drive, with "scenic" legs of the course taking runners up One Tree Hill as well as Mt Eden.

Congratulations to Alastair McDowell from Engsci Part II who ran the entire course by himself, finishing in a time of 1hr 14minutes, and the BME Part IV team who won the relay with a time of 1hr 24minutes. Engsci Part II and Engsci Part III finished 2nd and 3rd respectively. BME Part III won the best dressed team award with all team members dressed in pokemon costumes.

Although the weather was not ideal for the event, we had a great turn out from all participants as well as supporters and volunteers, which deserves a big thank you. The day finished with a BBQ back at the department where Poul Nielsen received oxygen.

We would like to see the relay develop into one of the main events on the DES calendar with everyone looking forward to the event each year, as a runner, supporter, or volunteer. It is our hope that teams will take up the challenge of becoming Coast 2 Coast champions each year. The event is a great way to engage with class mates and develop class spirit, a unique characteristic of the Engineering Science Department.



2011 Annual Student Bakeoff

The annual student bakeoff was held on Monday 9th May, and the effort put in by the 25 entrants was truly impressive. Points were given based on taste, presentation, originality, and suitability to theme. The judging panel was made up of staff whose names were kept under wraps until the day, so that no bribery could take place.

Mahdieh Nejati was the overall winner with her pastry salmon fish - which was both delicious and beautiful. It was also the only savoury entry. Mahdieh is a Part IV Mechatronics student, who is doing her Part IV Project in the Auckland Bioengineering Institute alongside the BME Part IVs.

Photos:

Organiser Emily Hargrave-Thomas with Mahdieh Nejati

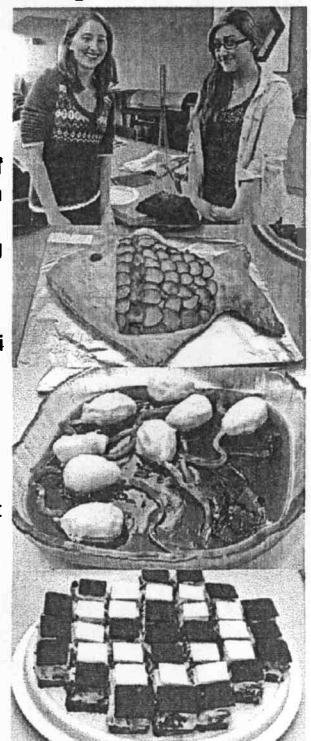
Overall Winner and 1st place BME Undergraduate Category: Mahdieh Nejati (Fish Fin Motion and Sensing Systems - salmon, pastry and vegetables)

1st place Engineering Science Undergraduate Category: Jesse Collis (Hydrodynamic Entrapment of Sperm Cells Close to Surfaces - apricot and white chocolate truffles, on a layer of jelly)

1st place BME Postgraduate Category: Michelle Deacon (Aortic Wall - cookies and cream slice)

Baking photos courtesy of Michelle Deacon

For more on the bakeoff...





Dr Eylem Kaya

"Computer Modelling of ReInjection in Geothermal Fields"

Abstract:

Eylem used computer modelling to investigate the effect of injection on steam production to decide on optimum reinjection strategies for various types of geothermal systems.

Reinjection of water into a geothermal system during utilization is intended to serve two purposes: (a) improved resource recovery and (b) waste water disposal. To be able to accomplish these two purposes and provide good field management, careful design of the reinjection system is required. This design should balance the requirements to sustain the reservoir pressure and to prevent early breakthrough of cold reinjected water. Also the effects of reinjection on the natural hot recharge, and therefore on energy recovery from the system should be considered.

She surveyed the worldwide reinjection experiences and influences of various strategies on hydraulic and thermodynamic conditions of the fields. Based on these experiences she investigated the effect of various reinjection strategies on "hot water", "liquid-dominated two-phase" and "vapour-dominated two-phase" reservoirs. The result of this study can be used in an attempt to establish some guidelines for geothermal reinjection strategies according to the generic characteristics of the fields.

Eylem is currently employed as a postdoctoral research fellow in DES, investigating future deep geothermal development in the Taupo-Reporoa Basin.

Archer to receive SPE Award

Rosalind Archer is to receive the 2011 Society of Petroleum Engineers (SPE) Asia Pacific Regional Faculty Achievement Award. The award presentation will take place at the SPE Asia Pacific Oil & Gas Conference and Exhibition; scheduled to be held 20-22 September 2011 in Jakarta.

From the SPE website: "The SPE Regional Distinguished Achievement Award for Petroleum Engineering Faculty recognizes superiority in classroom teaching, excellence in research, significant contributions to the petroleum engineering profession and/or special effectiveness in advising and guiding students. It is presented based on the recommendation of the regional director or the regional award committee."

DES Research Seminar Series

Semester One saw a revamped weekly seminar series. Speakers included visitors to DES from Germany, US, Australia, as well as contribution from the local talent (full list below), and topics ranged from modelling of nanomechanical sensors to wind energy forecasting.

Prof. Sven Krumke (Kaiserslautern): Mathematics and soccer

Prof. Jerry Brown (NPS): Optimization tradeoff: hard-won insights from real-world decision support

Marie Schmidt (Goettingen) : Optimization problems arising in public transportation

Keith Parks (Xcel Energy): Wind energy integration and forecasting

Katharina Beygang (Kaiserslautern): Train marshalling problem

Dr Stuart Norris (Auckland): What happened to all my work? Entropy and fluid mechanics

John O'Sullivan/Oddo Zhang (Auckland): Advances in computational fluid dynamics for modelling wind flow over complex terrain / optimisation of ambulance move-up

Dr Pierre Girardeau (Auckland): An application of stochastic optimization to power systems

Dr Ashvin Thambyah (Auckland): A philosophical reflection on the nature of engineering research and education

Jonathan Cheng (Auckland, PhD): Thermomechanical constitutive models for fiber reinforcements in liquid composite molding

Prof. John Sader (Melbourne): Dynamics of nanomechanical cantilever devices in fluid environments

for future seminar listings...



Dr Juliet Newson

"Models of geothermal surface features at Wairakei"

What have I been doing since completion? I have been teaching for the Post Graduate Certificate in Geothermal Energy Technology, in addition I am involved in geothermal surface feature monitoring for Environment Waikato, and I also have other geothermal reservoir simulation work. I have been elected to the Board of Directors of the International Geothermal Association, where I Chair the Education Committee, and I am also on the Board of Directors of the New Zealand Geothermal Association. In my spare time, since completing my thesis I have been able to spend more time on surf sports in various forms, currently I am concentrating on surf ski training, and also trying to qualify as a surf rescue boat driver. In case I have any spare time I have a house in Ohakune (near Mt Ruapehu), which after being neglected in preference to the thesis, is now crying out for some serious maintenance...

News in brief...

They're using Optima predict down there...

Optima predict has been used by St John to determine improvements that can be made as part of the recovery process of Christchurch after the February 22nd earthquake.

Do you have news to share?

News on current staff and students is easy to obtain, because they're right here. News on wider family members - alumni and former staff - doesn't necessarily reach us. If you have something to share, email it to desnewsletter@auckland.ac.nz