



Faculty of Engineering Newsletter



Message from the Sub Dean

In Chris's absence I thought I might take the opportunity to discuss the state of student recruitment and some of the challenges facing the university and faculty over the next few years. Our reputation as a university on the world stage depends on the quality of our research. With the ubiquitous availability of data on the Internet, the world ranking of universities can have local implications. Research is a core part of being a University and has intrinsic value in itself. In all discussions on teaching we need to acknowledge the importance of research. We cannot though make the excuse that because we need to be strong on research, we can't spend enough time to be excellent in teaching. There is no reason why the Faculty of Engineering cannot be in the top three faculties for excellence in teaching. I believe that physics and engineering have some of the toughest courses in the University but we also have some of the most interesting courses. There is nothing to stop us running courses that are challenging and enjoyable for both students and staff.



Besides the intrinsic value of good teaching there are some very pragmatic reasons why we need to improve our teaching quality. In 2012 there will be \$136 million available to universities based on the following areas:
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Women in Engineering and Physics Network

On 22 September another "Women in Engineering and Physics Network" lunch was held, with 27 students attending as well as 4 girls from a Sydney high school and their teacher. This was an hour full of interesting presentations and it went by all too quickly.

Two students, Yan Xu and Louise Ray, gave us a presentation about their 3 week course in Paris at IWE (International Institute for Women in Engineering) in July this year. Sadly, this was the last summer course there, as after 10 years IWE's summer program has been cancelled.

Emma James from AECOM in Sydney was our guest speaker and she works in the area of Water Sensitive Urban Design. Her work focuses on the treatment of stormwater to protect the environment and influencing urban design and management of the urban water cycle to minimise resource use (potable water consumption and energy use) and to maximise amenity and other benefits (microclimate control, enhanced landscape outcomes, low maintenance/self sustaining landscapes, nutrient recycling and food production). This was very interesting to hear, as we are all affected by the threat of a lack of water and how we should look after it.

And finally, Gabbee Elsing and Shaza Raini (also UOW students) told us about their St. Mary's High School "Women in Engineering Day" project that they were developing to promote

to engineering to girls in Year 10.

A special thank you goes out to all the presenters for providing the students such useful information.



Students, Yan Xu and Louise Ray at IBM Company sustainable visit in Scesux Park. Both students stand in the back row: Louise is the fourth from the right and Yan Xu is sixth from the left.



Students, Yan Xu and Louise Ray at seminar at IWE in Paris. Yan Xu stands fourth from the right and Louise stands first from the left.

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- 1) Proportion of domestic undergraduates who are from a low SES background as measured by Census Collection District and Centrelink payments data (low SES target) - 20%
- 2) Domestic undergraduate satisfaction with teaching (combination of Course Experience Questionnaire (CEQ) Good Teaching Scale and Overall Satisfaction Item (GTS/OSI)) - 40%
- 3) Domestic undergraduate satisfaction with generic skills (CEQ Generic Skills Scale (GSS)) (satisfaction with generic skills target) - 40%

You can see why I go on so much about survey scores. This is why we are now also undertaking recruitment activities with years 10 and sometimes below. Universities have been largely independent of government and regulatory interference until recently. Above is the one of the changes imposed by government. i.e. performance criteria. Given the increased pressure on universities to perform we may be at risk of dumbing down our degrees. To stop this happening we are under increasing scrutiny of agencies such as the Australian Quality Framework. The framework will define what is bachelors degree or what is a masters degree. Until intervention of the Council of Engineering Deans it looked as though the 4 year engineering Degree wouldn't have been equivalent to the science end on honours degree. We must be vigilant in monitoring the wider national agenda. On the plus side it might prevent a race to the bottom on quality of masters degrees for overseas recruitment. Another challenge in this space is Engineers Australia now accrediting masters programs. Should we get our masters accredited? If so how would, we need to change the degrees?

The faculty has done an excellent job of increasing the number of undergraduate students in our degrees over the last 5 years. How can we improve the quality of the applicants and respond to the government's agenda in terms of student retention? There are a number of initiatives that the university is taking. You may have seen seminars on the "first year experience" that is one of these initiatives. Outreaches to year 10's and below are other examples. I believe that increasingly we will have to take a holistic approach to the students which will include a "cradle to the grave" approach. I can see us in the future making contact with primary school students (a step too far maybe !!), mentoring them through high school, inviting them to summer programs, shepherding them through early entry, informing them at orientation, looking after their personal welfare during their degree, making sure they pick up engineering skills, graduate qualities and personal skills and even friendships as well, graduate them while introducing them to perspective employers and getting them back for further education in masters by coursework and research degrees. While the above may seem extreme, we will have to go somewhat down that path.

Be prepared to be put under pressure to keep both your research output and quality high as well as improve your teaching quality. I think we all deserve the latest 4% pay rise!

A/Prof Muhammad Hadi attends ACE 2010

The Faculty of Engineering's Associate Professor Muhammad Hadi recently attended The Ninth International Congress on Advances in Civil Engineering (ACE 2010) which was held at Karadeniz Technical University in Trabzon, Turkey from the 27th- 30th of September 2010. The aim of ACE 2010 is to expand the lines of communication between academics, researchers, and practitioners in the fields of Civil Engineering. The event also acts as a forum to review and share recent achievements and advancements in the area of Civil Engineering at an international level.

Muhammad presented two papers during the conference; the first paper entitled; *Base Isolated Adjacent Buildings Considering the Effect of Pounding and Impact due to Earthquakes* was co-authored by PhD candidate Mr M Eren Uz. The second paper presented by Muhammad at ACE 2010 was co-authored by PhD candidate Mr Veysel Yazici and is entitled *Limiting the Slenderness Effect due to FRP Wrapping in Reinforced Concrete Columns*. Both papers were very well received at the conference.

Mining Staff Digging for Gold

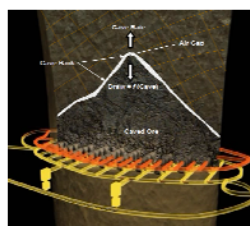
Associate Professor Naj Aziz, Dr Jan Nemcik and Dr Ting Ren recently made a field visit to Cadia Valley Operations of Newcrest, one of the world's top 10 gold mining companies by production, reserves and market capitalisation. The main purpose of this visit was to update the last Metaliferous Mining knowledge for teaching and to discuss potential research initiatives and student training programs.

Cadia Valley Operations is the largest gold and copper producer in New South Wales and one of Australia's largest gold producers. Cadia Valley is located in central western New South Wales, Australia, 20 kilometres south-west of the City of Orange, and approximately 250 kilometres west of Sydney. Operations comprise the large, low grade Cadia Hill open pit mine and the higher grade Ridgeway underground mine.

The group was welcomed by Geoff Dunstan, Manager of Mining Underground Cadia Valley Operations. A Wollongong Mining graduate himself, Geoff has worked on many projects in Metaliferous mines in Australia, Indonesia, Chile and South Africa. 'Wollongong graduates are much needed and welcomed by the industry', said Geoff while introducing his working experience and Cadia Valley Operations.

The visit was guided by Geoff Dunstan, and started by examining the surface facilities and the subsidence site resulting from underground operations. The group then toured the entire underground operations. The mine uses a *Block caving* mining method

in which a block of ore is undercut, following the drawing of the broken ore, caves progressively. The underground visit took about two hours to complete.



Block Caving Method

Upon surfacing, the group had technical discussion with Geoff on a number of observations during the underground visit which included geotechnical design, caving method and mine ventilation management issues. The group also discussed potential research projects and student vocational training programs. While concluding the visit Geoff Dunstan told the group; 'We will welcome Wollongong graduates to take on our student training and vocation programs'.



From left: Geoff Dunstan, Dr Ting Ren and Associate Professor Naj Aziz



From left: Associate Professor Naj Aziz (UOW) Geoff Dunstan (Operations Manager Ridgeway Deep) and Dr Jan Nemcik (UOW)

Research Fellow Profile



Dr SUREYYA SARICILAR completed a Bachelor of Science Degree in Chemistry and a Master Degree in Chemistry/Polymer at the Middle East Technical University (METU), Turkey. During her Master program in Turkey, Sureyya worked as a demonstrator/tutor in the analytical and general chemistry laboratories from 1986 - 1988 before migrating to Australia

Her first project in Australia involved the optimization of rare earth catalysts for the oxidative coupling of methane to ethane and higher hydrocarbons at CSIRO. Sureyya was involved in many other multi-disciplinary research projects and teams while working for CSIRO from 1989 to 1996. She had a child in 1994 and started to work at ANSTO on a part time basis in 1996.

In 2001, while working part-time at the Organic-Environment laboratory at ANSTO, she commenced her PhD with the University of New South Wales. Her PhD research involved synthesizing novel block copolymers, gas permeable materials and **hydro gels (physically and chemically cross-linked gels)** with random and block structures via thermal and gamma radiation induced polymerization. Their properties were investigated for use in extended wear contact lenses. At UNSW, SUREYYA also worked on a project synthesizing

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nano-particles (micelles or nano-microgels) with a degradable cross-linked core and low molecular weight polyethylene glycol (PEG) corona for antitumor drug delivery.

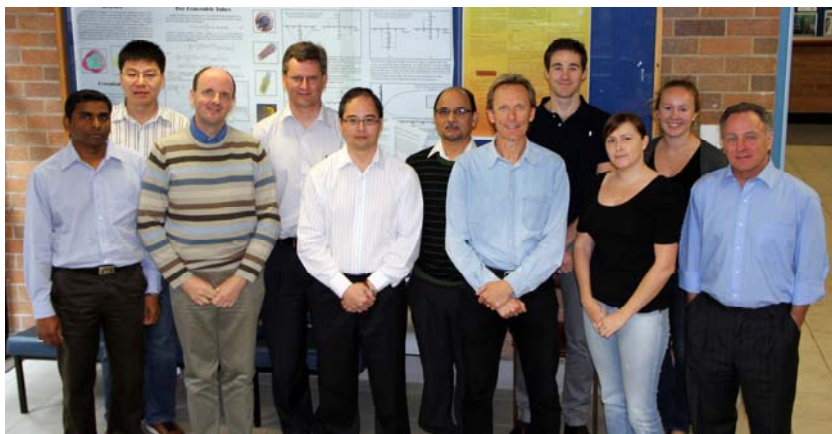
In 2006-2008, she worked at the Nuclear Reactors (HIFAR & OPAL) on a full time basis during the commercialization process of the OPAL reactor, and then worked at Bragg Institute on the SAXS instrument. She also worked as an honorary research fellow at University of Sydney at the same time while working at Bragg Institute, ANSTO.

In-2008, she started to work at UOW on a project funded by IPRI. She designed and synthesized a novel & tough Double Network (DN) hydrogel that may possibly be a substitute for artificial cartilage and tendons in the future. Recently she has been working on the ACARP project (TOUGH SKIN for the mining industry) and on the hydrogel project at the same time.

Surreyya's career path has given her expertise in polymer synthesis (free radical, condensation, radiation including gamma and UV polymerization, high pressure systems) and characterization techniques including chemical, mechanical, microscopy, thermal, chromatography, and spectroscopy.

Pinnacle Master Modelling Course

Prof Peter Metcalfe from Centre For Medical Radiation Physics (CMRP) University of Wollongong and Dr Nick Hardcastle, (Dept. Human Oncology and Medical Physics, University of Wisconsin-Madison) organised and lectured a physics master modeling course in late October. The focus of the course was to explain the physics models behind the Philips Pinnacle radiation therapy treatment planning system. A contract was arranged between the University of Wollongong and Insight Oceania Ltd (agents for the pinnacle system) so that the University would be paid a fee per student. Funds raised from the course will be used to support hardware upgrades in the treatment planning laboratory. Course participants came from Victoria, Darwin, NSW, Tasmania and QLD.



Left to right for caption- Sankar Arumugan (Liverpool, NSW), Li Fan (Insite Oceania), John Shakeshaft (Previously Claterbridge UK, now Darwin), Steven Wallace (Launceston, Tasmania), Peter Phung (Radiation Oncology Victoria), Rakesh Joshi (Darwin), Peter Metcalfe (CMRP), Nick Hardcastle (U of Wisconsin-Madison), Danielle Tyrrell (Mater, QLD), Alexandra Quinn (CMRP), John Baines (Mater, QLD)

The course content included- Monte Carlo dose Engines (lectures by Dean Cutajar, and Susanna Guatelli). Convolution Dose Engines, Biological optimization methods and volumetric modulated arc radiotherapy were covered in detail by Nick Hardcastle, and Peter Metcalfe. Six pinnacle workstations were available and the participants received hands on demonstrations about the modeling parameters required to create accurate beam models. Several of Prof Metcalfe's previous and current students helped with laboratory supervision during these hands on sessions. There was also an intensity modulation dosimetry validation demonstration at Illawarra Cancer Care Center, with expertise provided by Mike Bailey and Jo McNamara. Gary Goozee (Liverpool, Cancer Centre NSW) provided some advice about the advantages and potential pitfalls of scripting in pinnacle. A Deformable image registration demonstration was provided by Wendy Schumer from Insight.

ARC Grant Success for Medical Radiation Physics

Professor Rozenfeld, along with Professor Metcalfe, Dr. Marco Petasecca and Dr. Susanna Guatelli from the Centre for Medical Radiation Physics with A/Prof Jackson from Prince of Wales Hospital and A/Prof Carolan from the Illawarra Cancer Centre have been successful in their ARC grant application for Unified platform for real time QA in radiation therapy in brachytherapy based on high resolution silicon detectors (Magic Plate)

This project will design and manufacture new devices for measuring the amount of radiation given to the patient during radiotherapy. This will improve the accuracy and safety of cancer treatment as well as greatly reducing the time needed to perform essential safety checks.

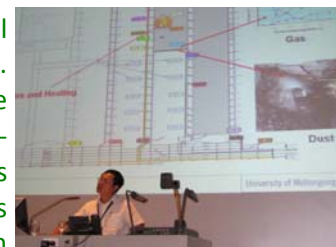
11th Coal Operators' Conference "Coal 2011"

The 11th Annual Coal Operators' Conference "Coal 2011" is scheduled for the 10th and 11th February, 2011. With more than 60 submitted quality papers, the conference is posed to be very lively and technically thought provoking gathering. The papers come mainly from Australia; however there are also papers from Canada, China, Germany, Iran, Pakistan, Poland, UK and USA. The international interest in this event is a clear demonstration of the increasing importance of the conference to coal mining community worldwide. Topics covered in the conference will include, headings development, mining methods, equipment and machinery, information technology and communication, ground control instrumentation, rock and cable bolting, mine ventilation, gas drainage, outburst control, mine fires and spontaneous combustion, mine dust, risk management and legal issues. Particular focus is on the mine operators' papers and issues relate to efficient and safe mining. The conference will also include several papers from the mining engineering group of the Faculty of Engineering, UOW.



In photo from left: A/Prof Naj Aziz, Colin Bloomfield, President BHP Billiton Illawarra Coal Holdings, Michael Catchpole (CEO, Aus I MM), Prof Gerard Sutton (VC), A/Prof Ernest Baafi and Bob Kininonmonth

In February 2010 the conference celebrated its 10th anniversary. During that period a total of 331 conference papers were published within the ten printed volumes of proceedings. From December 2008 digital copies have been made available online via the UCOC website <http://ro.uow.edu.au/coal>. Since going live, visitors to the site from more than 120 countries have downloaded over 68,000 individual conference papers. Online availability has greatly improved access for students, researchers and mine professionals world-wide. It has also enhanced the reputation of the University of Wollongong as the centre of excellence in teaching and research in mining engineering, with a keen interest in promoting mining technology nationally and internationally.



Dr Ting Ren, UOW presenting his paper at Coal 2010

As in previous years, the conference is sponsored by various coal mining companies and other organisations, including BHP Billiton – Illawarra coal holding, Peabodyenergy, Australia, Anglo coal Metallurgical Coal, Australia, Minova International, Jennmar Australia, Becker mining Systems and there exists the opportunity for exhibitors to showcase their products at the conference.

The conference is jointly organised between *the University of Wollongong, the Illawarra Branch of The Australasian Institute of Mining and Metallurgy and Mine Managers Association of Australia*. Further information on the conference and online registration and others, please visit: <http://www.coalconference.net.au> or <http://research.uow.edu.au/coal>

Australian Geomechanics Society Field Engineering Geology course

Dr Phil Flentje, Dr Fred Baynes (Consultant Engineering Geologist from Baynes Geologic in Perth, and President of the International Association of Engineering Geology and the Environment) and Mark Eggers (Principal - Pells Sullivan and Meynink) have recently completed teaching of the first Australian Geomechanics Society 8 day Field Engineering Geology course; a Continuing Professional Development (CPD) course for engineering geologists and geotechnical engineers. This course is similar to the AGS Geology for Engineers course based in Adelaide, which is aimed at teaching geology to geotechnical engineers with a limited geological background. However the Engineering Geology Course based in Wollongong places more emphasis on logging, mapping and developing models for engineering projects and evaluating the engineering characteristics of the ground through field observations. Phil also helped deliver the last Adelaide Geology for Engineers Course in Adelaide in 2008.

The Adelaide course has been built on the career work of David Stapeldon in and around the Fleurieu Peninsula of South Australia. That course has been run over the last 10 years by David Stapeldon himself (now retired), Alan Moon of Coffeys, Fred Baynes from 2008 with the Phil Flentje. Alan Moon is now proposing to step aside in 2011 and Mark Eggers will join Fred and Phil to deliver that course. The Wollongong course has been built entirely from the ground up and has drawn heavily on the local field expertise of Phil Flentje. The course development for Wollongong started over a cup of coffee in Brisbane in late 2007 during the ANZ geotechnical conference where we were lamenting the complete lack of university training available for this very specific and important field of geology. The AGS has provided seed money for the development of the course materials. A course website has been developed: <http://www.australiangeomechanics.org/w10/>

Most of the course field work was centred in the Wollongong area (at Bombo Quarry near Kiama, Stanwell Park north of Wollongong, Thirroul Beach and along the Shoalhaven River near Nowra) but we also needed to do some work in non-Sydney Basin rocks, that is outside of the sedimentary basin type rock environment (i.e. NOT sandstones, mudstones and coal). The Goulburn area proved to be just the ticket!

Fred and Phil have visited the field sites four times prior to the course, initially in search of good rock exposures/field sites for the required field training purposes. Our searches for the right sites took us as far afield as Tuross on the far south coast and down to Nerriga and others sites south and west of Goulburn. The Pejar (Spillway) granite exposure was absolutely perfect for the mapping work as was the complex Devonian metamorphosed meta-sedimentary and igneous rocks of the Mount Fairy Group exposed in the spillway of the Sooley Dam. The limestone exposures around Kingsdale allowed yet another rock type to be introduced, some mining history and mineral processing aspects to be incorporated into the field work activities. The Bumana Creek area also facilitated a brief but important discussion on hydro-geology and the importance of water resources to Australian rural communities.

The course was a sell-out several months prior to the course starting and we had 18 practising geotechnical engineers and geologists involved in civil and mining projects. These 'students' all have 3 or 4 years (or more) industry experience and were familiar with making geological observations, and choose to enhance and develop their engineering geological skills. They came from all states of Australia and one geologist came from Golder's in Jakarta. The principal objective of this course is to teach students how to apply geological skills in the field to help solve engineering problems. This was carried out by using guided field exercises, in which the students learn by carrying out realistic project related work in the field whilst being supervised by very experienced practitioners (staff to student ratios of 1:6).

The University of New South Wales, offers up to 6 Credit Points to their Master of Engineering Science in Geotechnical Engineering and Engineering Geology for students successfully completing either the Australian Geomechanics Courses 'Geology for Engineers' in Adelaide or the 'Engineering Geology' in Wollongong.

All the participants and the three presenters acknowledge that the course was an outstanding success, and the Goulburn leg of the trip certainly added significantly to the course outcomes. We envisage the course will now become a regular bi-annual event. It is now scheduled to run again in late September 2012. The AGS Adelaide Geology for Engineers course is also now to become a bi-annual event and is scheduled to run in late September 2011.

It was also great to see green fields, full farm dams, a capacity Sooley and a half full Pejar and smiles on many faces throughout Goulburn as we passed through. On previous visits to town during development of the course we witnessed Pejar as nothing more than a series of puddles. The rain caused us to fear the dams actually spilling on our planned trip and a few nervous phone calls to Goulburn Mulwary Council in advance of our arrival. But we managed to organise a full Sooley, that's stopped spiling just a few days before we arrived!



In photo above: Attendees at the AGS Field Engineering Geology course atop Bald Hill in Stanwell Park. Participants are from all states in Australia and Indonesia.