Dean’s Spot

At this time of the year our Faculty hosts large numbers of high school students who are trying to choose their career and to decide what University course and which University to enrol in for 2008. Naturally we think that Engineering and Physics at University of Wollongong offers a wide variety of challenging and worthwhile careers and so we are very keen to convince as many students as possible to come to our Faculty. Hence we run an innovative and comprehensive 'Early Entry' program.

This program was pioneered by Engineering at Wollongong over 10 years ago, and has now been adopted by most other Faculties here, and even by other Universities, such as University of New South Wales, who introduced their own early entry scheme last year. Our scheme aims to introduce the career of Engineering to potential students. We organise personal interviews for every student so they have a chance to discuss with practising engineers details of exactly what an engineer does in real life. Each potential student is allocated an interview time with one of our academic staff, assisted by a member of our experienced technical or administrative staff. Since our academic staff are all practising engineers, and our administrative and technical staff are very experienced with our courses and our technical work, this is a very direct way for a student to find out the answer to the question ‘What does an Engineer do?’

We consider that this interviewing process is a meeting of equals— the student is interviewing us to find out more about the profession of engineering, and we are finding out from the students what career they are looking for, and what sort of a person they are and what they like doing. We recognise that academic attainment at school is only one measure of ability. Personal and communications skills, motivation and enthusiasm are all important qualities of a good engineer and so we are also very interested in what students have achieved in their non-academic lives. For example, in addition to abilities in maths, science and languages, we are looking for any examples of leadership, creative, and imaginative or other skills students may have demonstrated. This may be apparent in non-academic areas such as sport, music, debating, social or other activities, either within school or outside of school. We are interested in each student as a complete person, as this is important in establishing whether or not someone is likely to become a good engineer.

So far this year we have interviewed over 300 people interested in joining us in 2008. The majority of these interviews are held over a two day period, and nearly half our entire academic staff and most of our administrative and technical staff are involved in face to face interviews with prospective students. Every student is also taken on a tour of our laboratories by either our technical staff or some of our senior undergraduate or postgraduate students where they can see for themselves many examples of real industrial engineering projects, and also talk to our current students to find out more about our courses and the engineering profession. Over three quarters of our degree students are now accepted into our courses after such interviews and we believe this is a much more thorough and accurate way of assessing a student’s ability, and assisting a student in selecting a University course which is best suited to them, than the traditional reliance on only a mark from School exams. Also in many cases we are able to offer unconditional entry into our courses based on the interview and on the students’ available marks, even before they have taken their final exam, thus considerably reducing the stress on high school students in their final year at school.

The early entry program is a wonderful team effort of staff and students from all parts of the Faculty and everyone involved is impressed with the enthusiasm and abilities of the students who apply for an interview. The feedback we receive is always very positive, with many students, and their parents, complimenting our staff on providing such friendly and informative one-on-one discussions. We believe our early entry program has been proven to be a great success over a considerable period, and its popularity with applicants show that it is much appreciated by high school students.
2007 Nobel Prize in Physics Stimulates Spintronics Research at ISEM

This year's Nobel Prize in Physics, awarded to Frenchman Albert Fert and German Peter Grünberg, for their discovery of Giant Magnetoresistance (GMR) has led to newly emerging Spintronics research. "The announcement is a great vote of confidence in the research of Spintronics at ISEM" said Prof. Dou, the Director of ISEM and Prof. Cook, the Dean of Faculty.

So what is magnetoresistance? The phenomenon magnetoresistance (MR) is the change of resistance of a conductor when it is placed in an external magnetic field. In general, the magnetoresistance effects are very small at room temperature for usual non-magnetic materials. The MR effect has been of substantial importance technologically, especially in connection with read-out heads for magnetic disks and magnetic sensors etc.

According to UOW's Associate Professor Xiaolin Wang, the first ARC QEII fellow on Spintronic materials research, and the Coordinator of the Spintronic and Electronic Materials Program in ISEM, "An electron has two important properties. One is its negative electric charge; and the other is its spin due to self spinning. The conventional electronics and its devices utilise only the electron’s charge for information processing, the spin is completely ignored. When both spin and charge are utilised simultaneously, astonishing and unusual physical phenomena can result. The electric resistance of a structure based on the electron’s spin changed significantly in the application of a small magnetic field at room temperature”.

“There is no heat dissipation when spin flips up and down. That means you can really put a laptop on your lap”, added Assoc. Prof. Wang.

The discovery of giant magnetoresistance immediately opened the door to a wealth of new scientific and technological possibilities. Just to mention a few of the impacts that the GMR effect has on our daily life: fast and slim laptops, multi-functional and slim music players such as IPods, MP3 players, as well as powerful internet search engines, all require hard disks where information is very densely packed and stored in the form of differently magnetised areas.

This technology may be regarded as the first step in developing a completely new type of electronics. The discovery of the GMR effect has opened the door to an entire new technological field, spintronics, where both the electron’s charge and its spin are utilised. Spintronics is now a driving force behind the rapid development of nanotechnology.

In 1998, Assoc. Prof. Wang and Prof. Dou of ISEM initiated, for the first time in Australia, the study of new types of magnetic materials, the so-called colossal magnetoresistance materials (CMR) - typical materials for spintronics whose magnetoresistance is much greater than GMR observed in metallic multilayers. Prof. Dou said “We took up the heat and set up a team on spintronic and electronic materials since the initiation of the spintronic research at ISEM. Some of team’s work published in 1998 has had a significant impact on the magnetic communities as evidenced by the highly cited papers, e.g. X.L. Wang, S.X. Dou et al, Applied Physics Letters, 1998 has so far been cited more than 100 times (excluding self-citations). The spintronic team has initiated a wide search for materials for spintronics since then. In collaboration with teams from ASNTO and NIMS in Japan, a new series of three and two dimensional cobalt based compounds have been successfully discovered for the first time and great interest has been generated worldwide. These newly discovered compounds introduce new physics and are useful in spintronics.

The spintronic research team has received quite a number of Australian Research Council Discovery and Linkage projects as well as Linkage International projects on the spin related research.

This year’s Nobel Prize in Physics, awarded to Fert and Grünberg, will further stimulate the existing extensive worldwide research on spintronics. Further breakthroughs are expected in new physics, phenomena, material and spin based devices. “The key issue in spintronics is to find the most effective way to manipulate the electron’s spin in various materials and devices.” said Assoc. Prof. Wang. “Our team has been working on the discovery of novel spintronic materials and developing novel approaches or ideas to manipulate the spin and charge in magnetic semiconductors based on superconductors, ferroelectric magnetic materials, diluted magnetic semiconductors and other novel magnetic materials in the forms of nano-structures, thin films, single crystals.”

The scientific community recognizes the important role electron spin plays, and assures a very bright future for our research groups in ISEM at UOW. To enhance our research on spintronics, superconductors and electronic materials, we are organising a symposium to be held in Sydney next year, IUMRS-ICEM 2008. Professor Dou noted “this will be a great opportunity to showcase ISEM’s research activities in this emerging field and enhance collaborations on both spintronics and superconductors”.

Congratulations

Mechanical Engineering Student Kirsty Last has won this year’s Judy Gordon Award. Kirsty received a certificate and award of $500.00 at the Illawarra/Sutherland Regional Group & Young Engineers Australia - Illawarra Annual General Meeting on Wednesday 14 November.

Ghiath Wahbi and Ben Rounsley were also nominated. They each received a gift certificate from Angus & Robertson.
Professor Roger Lewis was invited to speak at the ICMCS-2007 International Conference in the field of micro- and opto-electronics, computer science and communications. The conference aimed at bringing together scientists and engineers dealing with fundamental and applied research for reporting on the latest theoretical developments and applications in the fields involved.

A/Prof Zhengyi Jiang

Associate Professor Zhengyi Jiang has received a 2008 Australian Research Fellowship (ARF) award. This is the second ARF from the Australian Research Council awarded to Zhengyi, the first was awarded in 2002. As a project leader, Zhengyi has undertaken numerous R&D projects relating to materials processing technology. His significant contributions to this research field have resulted in over 20 scientific prizes and awards including the 2 ARF awards.

A/Professor Jiang recently delivered an invited plenary talk “Contact mechanics in cold rolling of thin strip” at the 3rd International Symposium on Advanced Technology for Plasticity, held in Nanchang, China from 15-21 October 2007. Over 400 delegates attended the conference.

Dr Zhixin Chen

Dr Zhixin Chen from the school of Mechanical, Materials and Mechatronics Engineering recently received the award of Guest Professor of the State Key Lab of Metal Matrix Composites on his recent visit to the School of Materials Science and Engineering at Shanghai Jiaotong University (SJU) in the People’s Republic of China. As a part of the visit Prof. Di Zhang, Deputy Director of the School of Materials Science and Engineering at SJU agreed to sign a Memorandum of Understanding Between the School of Materials Science and Engineering at SJU and the Faculty of Engineering at the UOW. The MoU will facilitate research collaboration with this very high-profile Chinese university with possible ARC collaborative work drafted for 2008 and onwards. Prof. Zhang will visit UOW next April as a part of his ARC Australia-China program.
Materials Field Trip to Tasmania

In late September Brian Monaghan took Engineering students for a week long whirlwind tour of a number of primary processing plants in Tasmania. They visited Rio Tinto’s aluminium smelter and BHP-TEMCO ferro/alloy units at Bell Bay, Australian Bulk Minerals - iron ore mine and pelletiser at Savage River and Port Latta, Zinifex - lead/zinc concentrators and electrolytic zinc production units at Rosebery and Hobart and the Copper Mines of Tasmania copper concentrator at Mt Lyell in Queenstown. It was quite a journey. Much was learnt and a lot of fun was had.

The plants we visited were more focused on the non-ferrous world of metallurgy, a world not often travelled by our students. All enjoyed the experience and as a result of this trip some may make the journey again in their employment travels after they graduate.

The Trip was sponsored by the AusIMM, BlueScope Steel and the Iron and Steel Society. Special thanks go to Ray Toulhurst for being the driving force behind this field trip and Craig Nealon of BlueScope Steel for volunteering to be our driver.

The Group photo is a collage of the students and the places they visited.

A/Prof Muhammad Hadi

Associate Professor Muhammad Hadi attended the 23rd Biennial Conference of the Concrete Institute of Australia under the title Design, Materials & Construction. The conference was held in Adelaide from 18-20 October 2007.

Muhammad's paper was about the behaviour of FRP (fibre reinforced polymers) wrapped steel fibre reinforced columns under eccentric loading. The conference was well attended with a big industry exhibition.

2008 Endeavour Scholar

An Endeavour Scholarship has been awarded to Chandana Kurukulasuriya from Sri Lanka. Currently a Senior Lecturer attached to the Department of Civil Engineering, University of Peradeniya, Chandana obtained his first degree from University of Moratuwa specialising in Civil Engineering. He then moved to Japan in 1993 to pursue postgraduate work at Saitama University in the field of Soil Mechanics and Foundation Engineering. Chandana will be supervised by Professor Buddhima Indraratna in the research area of Long Term Behaviour of Geogrids.

Prof. Kiet Tieu

Congratulations to Professor Kiet Tieu who has recently been elected as a Fellow of the Australian Academy of Technological Sciences and Engineering (ATSE).

The Australian Academy of Technological Sciences and Engineering (ATSE) is an association of professional men and women who are elected as Fellows of the Academy on the basis of their achievement in the application of science, technology and engineering to Australian life.