### FACULTY EXECUTIVES

#### Deans Advisory Committee

<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
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<tbody>
<tr>
<td>Professor Gregory Hancock AM</td>
<td>Dean</td>
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<tr>
<td>Professor John Small</td>
<td>Pro Dean</td>
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<td>Associate Dean Research and Research Training</td>
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<td>Associate Dean Information Technology</td>
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<td>Head of School Chemical and Biomolecular Engineering</td>
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<tr>
<td>Professor Kim Rasmussen</td>
<td>Head of School Civil Engineering</td>
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<tr>
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<td>Faculty Secretary</td>
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#### Presidents and Executive Officers of Foundations and the Warren Centre

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<thead>
<tr>
<th>Name</th>
<th>Position</th>
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<tr>
<td>Professor Michael Dureau</td>
<td>Chairman and Executive Director of the Warren Centre for Advanced Engineering</td>
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<tr>
<td>James Allen</td>
<td>President Chemical and Biomolecular Engineering Foundation</td>
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<td>Skender Bregu</td>
<td>Executive Officer Chemical and Biomolecular Engineering Foundation</td>
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<td>Peter Thornton</td>
<td>President Civil Engineering Foundation</td>
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<td>George Maltabarow</td>
<td>President Electrical and Information Engineering Foundation</td>
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<td>Professor Vassilios Agelidis</td>
<td>Executive Officer Electrical and Information Engineering Foundation</td>
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<tr>
<td>John Young</td>
<td>President Aerospace, Mechanical and Mechatronic Engineering Foundation</td>
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#### Student and Alumni Organisation

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<th>Name</th>
<th>Position</th>
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<tr>
<td>John Doherty</td>
<td>President Engineering Sydney Alumni Association</td>
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<tr>
<td>Nathan Byrne</td>
<td>SUEUA President</td>
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We arrived in the Philippines on January 7. It was a country that we knew and understood very little of. In the first night of our stay at the host village in Taguig, we were greatly surprised. Villagers had welcomed the team with shell necklaces, children blessed our hands, a whole band was playing to welcome us and a program full of dancing, singing and intermission numbers was planned out for us. That was the beginning of an amazing journey.

Each year a team of engineers from various backgrounds come together to work with Engineers Without Borders in their Development Education Experience and gain a set of valuable skills and knowledge. The experience provided exposure to sustainability, appropriate technology, the basics of construction, working with hospitals, schools as well as a holiday at picturesque locations. However, what inevitably changes people the most is the close interaction with local NGO partners and their beneficiaries.

Through the journey the group had learned of Gawad Kalinga (GK); a charity organization that built homes, communities and a nation. GK base their foundations on teaching values to support communities and to create lasting relationships between neighbours through the “bayanihan” spirit. They also encourage a positive mindset for the beneficiaries by painting GK houses in the colors of a rainbow and providing local facilities to sustain community activity.

GK staff readily gave time, efforts and spirit in providing housing solutions for the needy. They understand that they do not have the answer to every problem, but they seek to engage local and international volunteers to raise awareness and help restore pride and happiness to the Philippines. (Continued on page 4).
# Contents

01 Travelling to Learn  
03 Dean’s Message  
04 Travelling to Learn (continued)  
05 Sydney Crest in Space  
06 Interview with Dr. Itai Einav: Researching a rich vein.  
07 Professor Yiu-Wing Mai’s Election to the Royal Society.  
07 Faculty of Engineering and Information Technologies Scholarships Function: May 7 2008  
08 Smart Art at the School of IT  
09 Alumni in Profile: Class of Civil Engineering 1948 Reunion  
10 Research Conversazione  
10 Did you know?  
11 Engineering Sydney™ Engineering Alumni of the Year awards  
12 Faculty Executives

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In 2006, engineering schools in Australia awarded approximately 8000 bachelors degrees and other undergraduate awards, 3400 postgraduate coursework awards and 845 masters and doctoral research degrees. These numbers are insufficient to address the skills shortage in the near future. It is also interesting to note that 28%, 75% and 31% respectively of these graduates are international students. Clearly many international students are undertaking postgraduate coursework degrees to improve their employability in the Australian professional engineering workforce.

In 2009, the Faculty is introducing the two year Master of Professional Engineering (MPE) degree to help address the skills shortage. The degree will allow internationally trained engineers, people from non-traditional engineering backgrounds, and those wishing to change their area of engineering discipline to develop their professional engineering skills, especially generic skills including teamwork and communication, and professional practice skills.

The Faculty is also introducing a new five year combined degree BE(Civil)/ BDesArch combining Civil Engineering with the Bachelor of Design in Architecture. There is obvious market demand and the new program will cater for the emerging need for professionals who can bridge between architectural and structural engineering.

There will be an emphasis on the conceptual and aesthetic aspects of the design process in the Architectural studies to complement the structural design in the Engineering studies.

The University launched the Institute for Sustainable Solutions on Tuesday 15th July. The Institute will be a focal point for outstanding research into the big issues affecting our society in the future. The Institute will bring together some of the World’s leading thinkers in disciplines such as renewable energy, climate change, population growth, health, food and energy security.

The Faculty is already well placed in some of these areas with research in Sustainable Process Development (Dr Andrew Harris), Hydrogen Production (Professor Brian Haynes), Harnessing Wind and Wave Energy (Dr Jannette Frandsen), and Efficient Energy Use (Professor Vassilios Agelidis).

Professor Gregory Hancock
EWB was also fortunate enough to work with Habitat for Humanity, who focused on providing “simple, affordable housing” for people earning significantly less than the average wage. Group members had the opportunity to live and work alongside their Filipino families and create unforgettable memories.

Interacting closely with our Filipino counterparts gave the experience a whole new level of involvement. The people of the Philippines warmly welcomed EWB members and provided the participants with the greatest of everything that they had to offer. They made our team feel honoured. EWB members learned how to give care to people burdened by poverty. So close had become the bond between EWB members and their Filipino host families that many were left in tears when it was time to leave.

There was enough relaxation and reflection time planned near the end of the trip to enjoy the white sands of the Filipino beaches, to snorkel in tropical reefs and absorb everything that has happened on the journey.

For more information on Engineers Without Borders please visit their website:

www.ewb.org.au

Writer: Yi Ning Shen.

Images courtesy of Engineers Without Borders and Peter Sistrom.
A former University of Sydney staff member took his first flight into space on May 21, 2008 as an astronaut on the shuttle Discovery.

The first-time astronaut Greg Chamitoff was seen off by former colleagues from the University who were there to witness the launch, including Dr KC Wong, a senior lecturer in aerospace engineering.

Chamitoff has wanted to be an astronaut since his father took his family to see the launch of Apollo 11, NASA’s first mission to land on the moon, in July 1969. “I told him then that that’s what I want to do and kind of never gave up on that,” Chamitoff said in a NASA interview. “I have to admit that I kind of grew up on ‘Star Trek.’”

It is understood Chamitoff has taken a patch of the University of Sydney coat of arms into space.

Greg was a full-time lecturer at the then Department of Aeronautical Engineering (now School of Aerospace, Mechanical and Mechatronic Engineering) from 1993-1995.

Dr Wong, who attended the launch with the University’s Dr Hugh Stone, said Chamitoff had kept regular contact with his Sydney colleagues. “Personally, I am attending because it is a very rare, unique and special occasion to be able to witness a friend/colleague launching into space in a Space Shuttle.”

From quarantine, Greg sent this message to his University of Sydney colleagues: “In my first day of quarantine today, I’m thinking about you and all my friends and colleagues from the University of Sydney. There is a sizeable group of Australian friends coming across for the launch, and having seen a few launches myself, I know that it will be well worth the trip …”

“I have already learned one thing before even leaving the ground - that the meaning of one’s accomplishments and life experiences comes only through the sharing of them with friends and family. I miss all of my friends and colleagues from the University of Sydney, and will be carrying your spirit with me.”

Discovery delivered Japan’s $1 billion Kibo laboratory to the international space station. Once there Chamitoff begins a six-month mission at the space station as a flight engineer with the outpost’s Expedition 17 crew.

Story courtesy of the Media Office, University of Sydney. Images courtesy of NASA.
Interview with Dr. Itai Einav: Researching a rich vein.

Ariel Riveros interviews Dr. Itai Einav on his Faculty Research Award and the opportunities his work creates in his particular field of research.

AR: Can you tell me about your groundbreaking research into Breakage Mechanics?

IE: Yes, that research started basically not that long ago. However, it required knowledge that I have accumulated over the years. There were lots of pieces that were added together. At the end of these processes I ended up with a continuum theory – a theory that connects between stresses and strains, between energetics and kinematics. I call this theory Breakage Mechanics. I can probably claim that this is the first constitutive modelling theory to predict how grain-size distribution evolves within granular materials.

This aspect of prediction is based on energy arguments. That’s very useful for mineral processes, mining industry and geophysics.

The applications are just so wide. When I developed the theory I didn’t necessarily think of geophysics applications, food industry and things like that. But while I was doing the research I realized its potential.

In the past I was doing research that aimed to establish the mathematical foundations for creating models for the characterisation of materials, focusing my attention to soils.

However, slowly I have started looking more closely at the physics of granular processes, which was adding nicely to the earlier mathematical foundations. In the particular case of breakage mechanics, I got interested to find a way to explain how particles crush in a granular system, introducing energetic arguments. So I’ve started exploring this new direction in relation to confined systems which seemed to be missing, or more carefully, not fundamentally treated. There were lots of components, all adding up together to form this energetic theory.

AR: How did it feel once the theory started adding up?

IE: Once I have been on this train of ideas, everything just happened so instantaneously. It was an excellent feeling to be in this process! I was seeing one element of understanding adding up with another element of understanding – never contradicting – and I think that’s really important. I was trying to do this before but always ended up with one element contradicting the other. This time everything just fitted together. I guess it’s true that one should never give up.

People were surprised that it came all so quick but in a way, looking back, there was a reason of building up the fundamentals from before. So, although the physical understanding of the crushing came pretty recently, the mathematical foundation helped me to see ways of how this could be utilized.

AR: What is particularly innovative about your research?

IE: When I was writing the first paper in the Journal of Mechanics and Physics of Solids, it was more general and I was really leaving it open and not necessarily requiring the use of soil mechanics. The innovation here is the ability of predicting grain-size distributions using constitutive modelling. However, the use of the theory is much broader.

Out of the general theory I have I developed a specific model that explains soil mechanics in a way which is new compared to work that has been done in the last 60 years. This work was published in the Philosophical Transaction of the Royal Society of London.

There’s always a starting point for constitutive models of soils. At the moment the most frequently used starting point is to establish models based on the theory of critical state soil mechanics. I’ve seen breakage mechanics theory as a new way to start explaining soil mechanics, in an energetics way. While critical state soil mechanics is very successful for modelling clay materials, it fails for modelling sands, which can be classified as a brittle and crushable granular material. I think that the breakage soil mechanics theory can resolve the open questions in modelling sands. In fact, I have no doubts; our preliminary studies prove this point. It gives much better predictions and explanations to phenomena that the other theory cannot explain. That was really great news in terms of successfulness, but I am now focusing attention to address as many applications as possible, to get it across to the industry as quickly as possible. But this is probably going to be judged by what people call the test of time.

I don’t want to stop here, with the Breakage Mechanics theory. Yes, I want to keep on pushing the applications of this theory, to make sure that industry see the use of it, but I would also like to push the envelope of my research further to many other problems of particle mechanics – I’m currently working on soft particles which is the extreme opposite of the brittle particles. This contrast fascinates me.

Some new ideas in this direction – that’s where my focus is at the moment.
Professor Yiu-Wing Mai’s Election to the Royal Society

Professor Yiu-Wing Mai of Mechanical Engineering, University Chair and Director, Centre for Advanced Materials Technology, School of Aerospace, Mechanical and Mechatronic Engineering has been made a Fellow of the Royal Society.

The Faculty is delighted to congratulate Professor Yiu-Wing Mai on his election to a Fellowship of the Royal Society (FRS). Professor Mai joins Professor Roger Tanner as a Fellow of this prestigious society. The Aerospace, Mechanical and Mechatronic Engineering School can be truly proud of its leading academics and the research culture in the School over a very long period which has led to these Fellowships.

Professor Mai, who has been a Federation Fellow at the University since 2002, is recognized as an international leader on the fracture/fatigue mechanics and materials science of a range of advanced engineering materials. He has made significant, lasting contributions in several areas.

These include notably: a unified “crack-wake bridging” model for description of the fracture-toughening behaviours of coarse-grained ceramics, fibre cements and stitched/z-pinned composites; new fracture mechanics-based models for characterisation of composite interfaces due to fibre pullout and fibre fragmentation; and “essential work of fracture” approach for toughness measurement of ductile materials, specifically for polymer thin films, polymer blends and short fibre composites.

Faculty of Engineering and Information Technologies Scholarships Function – May 7 2008

The Faculty hosted a scholarships function that was held in the Wintergarden with approximately 40 people in attendance. The function celebrated all 2008 scholarship recipients. 13 first year students received certificates from the Dean, Professor Greg Hancock.

Michael Stanley from the RTA, Bill Thompson from Bilfinger Berger Services, Carolyn Talbot from GHD, Brian O’Keefe from the Order of Australia Foundation and Maurice Neirous attended the function.

The Faculty congratulates the new scholars:

Bilfinger Berger scholars- Alexander Wendel and Anthony Setiawan.
RTA scholars- Edward Hackney, Matthew McLaren, Robert Piet and Robert De Cataldo.
Chemical Engineering scholars – Joy Tang and Richard Alessi
GHD scholar – Elizabeth Henery
Order of Australia scholar – Amelia Parker.
Muriel Anderson scholar – Emma Connell
Winifred Margaret Neirous scholar – Elanor Pitt
Peter Nicol Russell scholar – Nicholas Marks
Smart art at the School of IT.

The line between science, art and technology is blurred in a unique exhibition.

The exhibition, titled “Visual Connections at the School of IT”, opened in the ultra-modern Francis-Jones Morehen Thorp-designed School of Information Technologies building on Tuesday, 10 June 2008. It includes pieces by both scientists and artists, all of whom are connected to the School of IT at the University of Sydney.

Some works in the exhibition are images of Information Visualisation - the science of taking large amounts of information and rendering them into two and three-dimensional surfaces to make maps and pictures of abstract data. Other pieces cross the line between art and science, exploring on canvas the issues of visual connection and the way technology has helped us make useful connections in an age of data deluge.

"Whether we deal in stocks, biology, medicine, sociology, politics, literature, marketing, engineering, industrial design or ecology, we all seem to be striving to find knowledge in a vast unmapped sea of data," says Professor Peter Eades, who helped organise the exhibition and is the Chair of Software Technology at the School of IT.

According to Professor Eades, Visual Connections explores the way we digest data in a world that is rich in information and explores the natural extension of information technology into art.

"Artists have had a long tradition of exploring and communicating in visual ways," says Professor Eades. "The information they seek to express ranges from unspoken emotions to cold logic, from the perceptual to the cognitive. So there is a connection between these artists and these scientists who visualise information."

Professor Eades says that many techniques and tools classically used by artists - such as spaces of points, lines and surfaces, colours, symmetries, enclosures and connections - are now used algorithmically by computer scientists.

Artists whose works are exhibited in Visual Connections include:

• Keith Nesbitt, who graduated with a PhD from the School of IT in 2003; his thesis gave design principles for multisensory information display. He is now a Senior Lecturer in the School of Design, Communication and Information Technology at the University of Newcastle.

• Tim Dwyer, who graduated with a PhD from the School of IT in 2005. His thesis synthesised and analysed pictures of financial and biological systems in two and a half dimensions. He now works for Microsoft Research in Seattle.

• Seok-Hee Hong, a Senior Lecturer and ARC Research Fellow at the School of IT. Her research covers the visualisation and analysis of large and complex networks, including the theory and practice of graph drawing.
Alumni in Profile: Class of Civil Engineering 1948 Reunion

Dean Greg Hancock, Professor Kim Rasmussen and Associate Professor Colin Dunstan of Biomedical Engineering attended a reunion of the class of ‘48 Civil Engineering graduates at the Royal Sydney Yacht Squadron in Kirribilli on 20 June 2008.

14 of the alumni of the class of ‘48 attended amongst them an ex-chief of the RTA, the founder of Sinclair Knight Merz, and the ex-head of Connell Wagner.

The Civil Engineers of this cohort worked mainly in government, holding high offices, particularly in New South Wales Government departments. This was a generation of engineers that built post-World War II Australia, contributing to the construction of infrastructure across the nation. Many of them were the builders of our water supply, which continues to be a pertinent engineering issue to this day.

Some of the alumni reminisced about their teachers, especially the figure of Professor “Willy” Miller. They also discussed their tuition in descriptive geometry and concluded that much had changed since 1948 but not much had changed in what is taught at universities.

Of particular note was the attendance of Roy Dunstan, alumnus of the Class of ’48, whose son is the previously mentioned Dr Colin Dunstan of Biomedical Engineering. As well, in attendance was Greg Scahill whose daughter, Anne Scahill, is Director of Change and Development at Sydney People in the University of Sydney.
Research Conversazione 2008

The annual Research Conversazione is the Faculty of Engineering and Information Technology’s premiere annual event to showcase the research undertaken by students over the past year.

It is an ideal opportunity for industry representatives and alumni to network and make contact with the engineers of the future.

The Research Conversazione 2008 will take place on Friday October 31 between 12 noon and 4.30pm. The event will commence with a welcome address that includes drinks and cocktail food in the Seymour Centre followed by poster displays and prize presentations in the Schools of Civil Engineering, Chemical and Biomolecular Engineering, Aerospace, Mechanical and Mechatronic Engineering, Electrical and Information Engineering, and Information Technology.

The Research Conversazione 2008 will also include the Alumni of the Year awards, which is proudly sponsored by Spruson and Ferguson.

The Research Conversazione is a key pillar of the Engineering Sydney objective to bring industry and students together. It is also an opportunity for guests to view the state of the art facilities of the Faculty and to speak to key members of research teams.

Engineering Sydney invite anyone interested in the research produced by the faculty to register to attend the Research Conversazione 2008.

To register online go to http://www.cs.usyd.edu.au/conversazione/ or contact Ariel Riveros, Project Officer, Engineering Sydney on ariveros@usyd.edu.au or telephone +61 2 9036 6571.

We look forward to seeing you at the Research Conversazione!

Did you know?

That our Faculty has a Facebook group? If you are on Facebook, checkout “Engineering and Information Technologies at The University of Sydney”. Feel free to put up a post or start a discussion…

One of our esteemed alumni, James Graham AM, received a Queen’s Birthday Honour this year. Our Faculty congratulates James on this outstanding award.

Another of our esteemed alumni, Andrew Tanner, received the University of Sydney Alumni of the Year award for 2008. The Faculty congratulates Andrew on this highly valued award.

- We are initiating a section called “Reconnecting Sydney”. If you wish to contact a past classmate we can place a small ad with your request.

We do not guarantee that your request will be answered. If your request is reciprocated, the Editor of this newsletter will facilitate contact between the parties.

If you are interested in making contact with an old classmate, please contact the Editor on ariveros@usyd.edu.au submitting a brief biography of your post-university activities.
Engineering Sydney™ Engineering Alumni of the Year Awards

Engineering Sydney invite nominations to the Engineering Sydney Engineering Alumni of the Year Awards. The awards, proudly sponsored by Spruson and Ferguson, will be presented at the Research Conversazione to be held at the Seymour Centre on October 31 2008.

PREAMBLE:

The awards are intended to recognize alumni of the Faculty of Engineering who have shown exceptional dedication, creativity or leadership in their field of professional endeavour which may include outstanding contributions to the community.

ELIGIBILITY: A person is eligible to be considered for an Engineering Sydney Alumni Award if:

1. The person is an alumnus of the Faculty of Engineering at the University of Sydney
2. Nominations may be self nominations or independent nominations
3. Nominations must be submitted in accordance with the procedures below.

NOMINATION PROCEDURE: Nominations for Engineering Sydney Alumni Awards must be lodged with the Executive Director, Engineering Sydney, Room 228, School of IT building J12, Faculty of Engineering and IT, University of Sydney NSW 2006 by October 1, 2008.

Nominations must include:

2. The name and contact details of the nominator and person nominated.
3. A curriculum vitae or summary of the professional and personal achievements of the person nominated.
4. A supporting statement of up to 500 words by the nominator that addresses the following matters in relation to the person nominated:
   a. The statement must address the criteria listed in the preamble above
   b. Self nomination must contain the names and contact details of three referees.

DETERMINATION OF AWARDS:
The Engineering Sydney Alumni Awards Committee shall, from among nominations received, determine the persons who should receive awards. There are two broad categories: Engineering Sydney Alumni of the Year and Engineering Sydney Young Alumni of the Year (awarded to a person aged 35 and under by the end of the calendar year). There will also be a special Engineering Sydney 2008 award to an alumnus who graduated in a year ending in 8. This award will be drawn from nominations in the categories of Engineering Sydney Alumni of the Year and Engineering Sydney Young Alumni of the Year.