

Teaching Excellence @ Civil and Environmental Engineering

Never Stand Still

Engineering

Civil and Environmental Engineering



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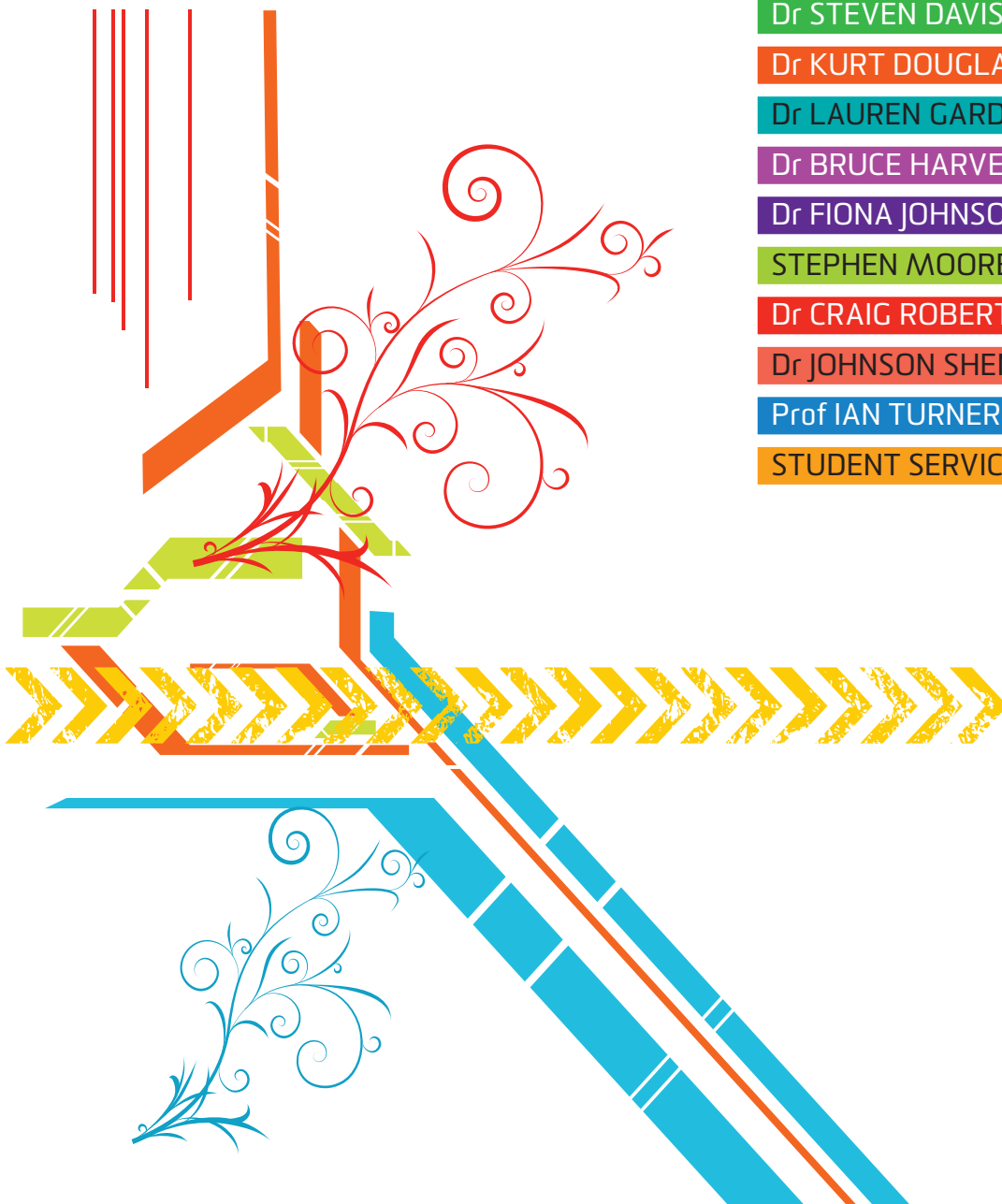
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ABOUT US

The School of Civil & Environmental Engineering is the largest School in the UNSW Faculty of Engineering, itself the pre-eminent centre for engineering studies and research in Australia. We are consistently ranked in the top 20 in the world and are ranked as number one in Australia (QS World University Rankings 2015-2016).

We deliver world class undergraduate and post-graduate degree programs -with a focus on sustainability as well as core engineering knowledge, preparing our students to face current social challenges and future needs with informed confidence. We believe that civil and environmental engineers are uniquely placed to meet and solve those challenges.

We continue to forge new links with industry and community partners to ensure a continuing real-world focus for both our teaching and our research.





WELCOME FROM THE HEAD OF SCHOOL

“Learning never ends for any engineer...”

Welcome to this special teaching excellence booklet, profiling just some of the wonderful dedicated teachers at the UNSW School of Civil and Environmental Engineering and the variety of learning experiences we offer.

As one of the largest Schools on the UNSW campus, we face unique challenges and great opportunities for innovative teaching. We actively promote a culture of teaching excellence, which I believe can be achieved by the measurement, acknowledgement and reward of good teaching. I was especially delighted when seven of my colleagues won UNSW Vice-Chancellor’s Teaching Excellence Awards in 2014; another record for the School.

Our School Teaching Initiative Grants scheme has provided innovative academics with resources that enhance their teaching and the student experience. Resourcing teaching has meant our academics have more time to generate ideas, delivering refined, well prepared and interesting courses. Teaching facilities, equipment and technology resourced by these grants are state of the art, creating a vibrant learning environment. Teachers that feel supported can, in turn, support students with creativity, patience and empathy.

The School believes that to holistically prepare students for a working life in engineering there must be a balance between theory and practice. We want students to graduate with the vital technical fundamentals of mechanics and mathematics, but also with the overarching, value adding skills of problem solving. Our degrees are not just about the ‘what’ but about the ‘how’ of learning.

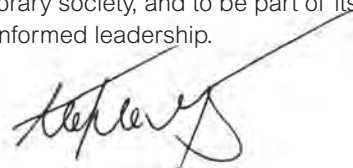
This emphasis begins from the first year subject “Design and Innovation”, a team-taught, activity based unit where students are introduced to the ‘big picture’ of the engineering industry. This course facilitates the shift in thinking from a high school student with an interest to an emerging engineer with a clear pathway to professionalism and possibility.

Learning never ends for any engineer. On site an engineer is often faced with problems not encountered before and is tasked with the innovative delivery of the solution.

The School is not just a witness to the industry, it is a force that helps shape the industry. We are constantly reviewing our courses at the School to stimulate this expanded focus.

I work closely with our hard working and lively student organisations CEVSOC and SURVSOC, helping them to strategise and to organise, to become more than a social club. Now CEVSOC activities generate not only a sense of belonging and community, but turn students into mentors and leaders confident enough to communicate with industry leaders.

That’s our aim – and the focus of our teaching and learning - to prepare our students to meet the challenges of contemporary society, and to be part of its useful, innovative and informed leadership.



Stephen Foster, Professor and Head of School



Associate Professor
MARIO ATTARD



Attard, Mario
Associate
Professor
Associate Head
– Academic
BE PhD MHEd
UNSW, MIEAust,
CPEng

Research Interests:
Finite Strain Isotropic &
Anisotropic Hyperelastic
Modelling: Fracture in
Concrete & Masonry:
Crack Propagation due to
Creep: Ductility of High
Strength Concrete Columns:
Buckling of Sandwich
Columns: Lateral Buckling
of Thin-Walled Beams.



STRUCTURAL ENGINEERING

Associate Professor Mario Attard has been writing and publishing in structural engineering for over 30 years. He is an awarded teacher; recognised by the UNSW Vice Chancellor in the 2008 Teaching Excellence Awards, and is now the Associate Head (Academic) of the School.

As an established academic he could sit back and rest on his reputation. Instead he is always seeking new ways to interest students. He has a passion for excellence in structural design and seeks to stimulate this in engineering students at UNSW. An expert in the mechanics of structures, he advocates sound design as the way to make our built environment stable, reliable, strong and resilient. This design expertise is relevant to both huge projects, like suspension bridges, and to the smaller structures, like concrete safety barriers.

He teaches how to minimise the structural deformations of warping, torsion, buckling, compression, creep and fracture in beams, walls, cylinders, columns, slabs, arches and masonry work. As a structural engineer he investigates the possibilities of design, making infrastructure safer and more cost effective.



He turns high school students into adaptive, lateral and innovative thinkers who are “knowledgeable, competent and functional”, highly employable in a wide range of occupations...

One of the ways he seeks to stimulate design innovation in his students is to engage in multidisciplinary teaching and to this end Mario co-created the innovative Bachelor Degree Civil Engineering with Architecture. With a major in Civil Engineering and a minor in Architecture, students are enabled to think conceptually and creatively. They learn to collaborate with other disciplines and methodologies, creating multidisciplinary teams that produce integrated and sustainable designs.

Mario is well qualified to design new curriculum as he holds a Masters degree in Education, as well as a PhD in structural engineering. He is an academic sought for his ideas on education as well as engineering. He espouses a problem-based learning approach to stimulate and refine skills in leadership, communication, teamwork and negotiation. He offers his students a holistic education, systematic and thoughtful. He turns high school students into adaptive, lateral and innovative thinkers who are “knowledgeable, competent and functional”, highly employable in a wide range of occupations.

He tempers his teaching with humour and kindness. He remains attuned to how students are developing with attention not only to results but to behaviour. This seasoned

teacher knows when a class is attentive and when they are drifting. He can sense when students are overloaded with information, when they need a change, a break or an alternative learning mode, and he has strategies on hand to avoid fatigue and disinterest. He believes in aiding those in difficulty, knowing that struggles come in many forms.

A/Prof Mario Attard is a teacher because he loves teaching. UNSW engineering students are indeed lucky to have such an experienced and attentive senior academic to guide them through their degree.

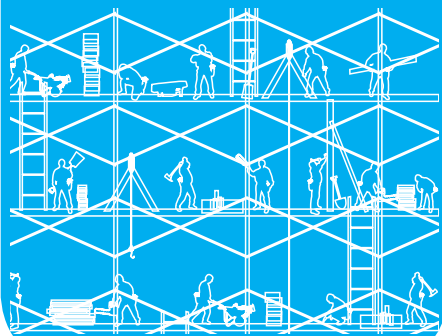
A portrait of Professor David Carmichael, a middle-aged man with glasses, wearing a dark suit, light blue shirt, and dark tie. He is smiling and standing in an office or laboratory setting. A computer monitor is visible in the background to the left. A blue curved graphic element is at the bottom of the page.

Professor

DAVID CARMICHAEL

Carmichael,
D G
Professor
BE MEngSc USyd,
PhD Cant, CPEng,
FIEAust, MASC

Research Interests:
Management, systems
applications of optimisation,
synthesis: Identification &
analysis: Contracts & disputes:
Project delivery: Construction
operations: Project
management & management
functional areas including
risk, economics, finances,
people resources & scope:
Construction management:
Problem solving & decision
making.



PROJECT & CONSTRUCTION MANAGEMENT

Professor David Carmichael teaches construction management and problem solving. He is one of the most experienced engineering academics in Australia. A long standing member of staff at the School of Civil and Environmental Engineering, Professor Carmichael is the living definition of an expert. He has published twenty three books and over two hundred papers on construction engineering and management.

He is constantly sought by industry for advice, standards development and arbitration. He continues to work as a consulting engineer as well as an academic, having particularly strong ties with Leighton Holdings. This is not an ivory tower academic. David Carmichael is an active participant in and a highly respected member of the Australian engineering community. With such broad experience in the engineering field he links students to the industry they hope, one day, to be part of.



**His detailed and highly structured course notes are legendary...
He is a teacher who desires to create leaders...**

David firmly guides his students toward independent thought and problem solving skills. Working with the receptive student in a “two way teaching process”, David believes “that the most important outcome of a university education is that the student becomes a thinking person who questions everything and does not accept anything at its face value”. This is pro-active teaching that encourages pro-active learning. He asks his students to be self realising and motivated, as these are the attitudes that will be attractive to future employers. These very same attributes will allow graduates to work through real life professional problems.

His courses combine theoretical rigour with the most recent engineering practices. His detailed and highly structured course notes are legendary. Winner of a 2014 Vice-Chancellor’s Award for Teaching Excellence, Professor Carmichael has refined his teaching content over many years, helping to provide the School of Civil and Environmental Engineering with an international reputation for excellence. He is most proud of this content for its unique “relevance to practising engineers”.

What is taught here is “unavailable in other universities, making the School the leading school in Australia and a leader internationally.”

He is a teacher who desires to create leaders. He expects that students develop professional skills as well as factual knowledge, producing graduates that are very employable and respected, leading to a fulfilling career for the future engineers.



Associate Professor

RON COX

Cox, Ron
Associate
Professor
Co-Chair, External
Relations
Convenor,
ACCARNSI
BE PhD UNSW,
FIEAust

Research Interests:
Climate change adaptation for
settlements & infrastructure:
Coastal engineering & coastal
zone management: Stability,
design & safety of coastal
structures: Application of
sand filled geo-containers
in coastal protection:
Environmental monitoring &
modelling: Desalination plant
brine disposal: Hydraulics of
water & wastewater treatment
plants: Flood hydraulics &
floodplain management: Life
safety, emergency warning &
evacuation.

CLIMATE CHANGE ADAPTATION & COASTAL ENGINEERING

Associate Professor Ron Cox is well known and widely respected in the engineering industry. Not just as an academic but an experienced consultant who has worked on numerous international projects. In 2008 he was named the John Holland Civil Engineer of the Year by Engineers Australia (EA) in recognition of his professional and academic contributions to industry and the wider community especially in the field of coastal engineering. Ron was a senior Editor and writer of various sections of the EA three-volume Guideline documents covering Coastal Climate Change, Sustainability and Climate Adaptation released in October 2012. He is an expert whom governments turn to when they need to establish protocols, guidelines and policy. Ron sits on various panels providing confidential advice to local, State and Commonwealth government agencies.

His teaching content fulfils his ambition 'to be relevant to both industry and community'. His expertise in climate change impact and adaptation, especially in coastal settlements and infrastructure is highly respected and connects his students



His strong links to industry allow him to understand exactly what employers are looking for...

with the most up to date knowledge about the most pressing concerns for our planet.

Ron believes in academic and personal standards, in developing a sound reputation, in ethics and professionalism. As he embodies these principles, he asks that his students develop into mature and principled engineers. His strong links to industry allow him to understand exactly what employers are looking for. Most graduates move into private sector consulting and the most important skill is the 'ability to work in a team professionally'. While the absorption of technical knowledge is assumed by most employers, what they seek is graduates 'who can manage their time, who can work to deadline, who can independently problem solve, who can focus and deliver and commit'. These professional attitudes are what will make graduates more employable and these he says, 'are transposable skills that can adapt to the unique culture of individual companies'.

While students under his teaching absorb knowledge and develop techniques in areas such as climate change, coastal engineering and management, field data collection and interpretation, modelling, hydrology and water resources, students will also be honing the professional and

ethical behaviours Ron holds so dear. In the courses he teaches, students are required to be committed, focused and professional. He assists this maturation process by making group workshop attendance compulsory, by keeping classes small, by training his teaching assistants to recognise signs of learning difficulty and signs of excellence, and by a time consuming process that makes plagiarism and academic dishonesty near impossible. He wants students to find their own bliss within engineering, knowing that this can take some time. One of his great joys in teaching is the 'surprise student' who rises above the pack, after struggling early. To Ron this obvious development and maturation is the great reward of teaching.

One of the highlights of the academic year for Ron is the Honours thesis presentations. Industry partners are invited and at times 'can't believe the quality of our students, because their presentations are phenomenal'. The best for the best. Not only are the students fulfilled, they become as graduates, representatives of the School and UNSW. Associate Professor Cox assiduously guards this reputation, hard won over decades and gained through the maintenance of high standards.



Dr STEVEN DAVIS

Davis, Steve
Lecturer
Chair, Teaching
& Learning
Committee
BE PhD UNSW

Research Interests:
Stochastic Systems:
Evolutionary Programming:
Parallel Computing
Applications to Civil
Engineering: Online
Assessment



CHAIR, TEACHING & LEARNING PROJECT AND CONSTRUCTION MANAGEMENT

Dr Steven Davis teaches construction management at both undergraduate and post graduate levels. Expert in areas such as cost, time and risk, his courses attract a wide range of local, international and distance students. Equally broad is the range of jobs available to graduates, including project appraisal, financial planning, project management and risk management.

Dr Davis is acutely aware that different cohorts of students have different needs. His distance learning students are from all across Australia and he ensures that his recorded lectures function as well online as they do in the lecture theatre. For international students he uses language carefully, diminishing cultural ambiguities and including pictorial information in assessments. For those on campus he remains highly attuned to class dynamics: even to the subtleties of expression and body language, always seeking “that exciting ‘aha’ moment” when he sees understanding on student faces.



Reflecting on his own student experience, Steve Davis seeks “to get into the mind of the student, to give them what they really need”...

Reflecting on his own student experience, Steve seeks “to get into the mind of the student, to give them what they really need”. He has learned over his years of teaching how to encourage a questioning mind to speak up. He welcomes student challenges, and fashions his content and methods around student needs, ideas and experiences. The question he most asks students is “does that make sense?” Then he gives them “that little bit extra” information or time to ensure that sense is indeed made.

As Chair of the School’s Teaching and Learning Committee (TLC), Steve says he feels “privileged to see the amazing things that different members of staff are doing in their teaching.” The TLC team constantly investigates teaching practices, seeking innovation and stimulating discussion between colleagues. It is also a meaningful interface between students and academics.

Since 2011 Steve has been developing graphical online assessment for his classes. Many engineering problems require that students be able to think in terms of graphic models in order to solve them. Existing online assessment could test students’ mathematical abilities, but not directly test their underlying model building skills. To achieve this he developed online software to allow students to create models such as decision trees and project networks.

Quantifiable student understanding increased immediately and significantly and the professional skills of an entire cohort were enhanced. Steve tests his theories and practices, unafraid of feedback, to create the most refined, detailed and effective engineering courses possible.

This technological skill is not surprising considering one of Steve’s areas of expertise is the use of Virtual Reality in construction visualisation. Not just technology for its own sake, Steve seeks to identify real world problems in the construction industry, analysing not just practices but assumptions, belief systems and deficiencies in industry modelling standards. This thorough and organic approach that looks at variables and probabilities seeks to make construction safer, more efficient and more structurally sound.

It is this unique combination of the technological and the human that makes Dr Steven Davis such an effective teacher. Constantly scoring highly in student feedback questionnaires, winner of a 2014 Vice Chancellor’s Teaching Excellence Award, and three School Teaching Initiative Grants, he gains deep personal satisfaction from teaching, and from watching his students grow.



Dr KURT DOUGLAS

Douglas, Kurt
Pells Sullivan
Meynink Senior
Lecturer of Rock
Mechanics,
Co-Chair External
Relations
BE (Hons1)USyd,
PhD UNSW

Research Interests: My main interests lie in the field of rock mechanics. Predicting strengths of large-scale rock masses (hundreds of meters) continues to be a major challenge. I am attempting to improve our understanding using laboratory tests, field studies & numerical methods. I am also currently involved in an ARC & Industry sponsored project researching erosion of rock spillways & backward erosion of embankment dams.



GEOTECHNICAL ENGINEERING

Dr Kurt Douglas is very clear about what sets the UNSW School of Civil and Environmental Engineering apart. Here, students put into practice the theories and fundamentals of engineering. Kurt believes the ‘real world’ is a classroom and that nowhere is this belief more important than in geotechnical engineering.

This field offers students challenging opportunities both here in Australia and overseas, working in offices and in the field. These engineers are responsible for big projects, making big decisions. They work with rock, soil and water: with what goes on underneath. As Kurt says “our best work is hidden”. Geotechnical engineers research, manage and predict ground conditions, using geology and advanced knowledge of soil, rock and groundwater behaviour. They design building foundations, tunnels, slopes, roadways, mines, and dams, in fact, anything connected to or within the ground. They play such a vital role in the success and safety of the planet’s biggest constructions, that training excellence becomes a necessity.



In Kurt's programs, fundamental theories are explored in the real world

To this end Kurt builds his program around field trips, where fundamental theories are explored in the 'real-world'. While these field trips vary in length they are never rushed. To be truly investigative, students are asked "to open their eyes", to become observant in that particular way that can 'see' what goes on underneath, what is hidden. Constantly practising and applying what they learn in the lecture theatre, students develop acute observational acumen, a pre-requisite in the geotechnical world.

A wide range of sites are investigated; mines, slopes, cuttings, dams, landslides. All the field trips reveal the complexity of real world challenges. There is never one singular, simple answer to the conundrums of construction. Sites are both within and outside the Sydney basin, representing a range of geological types and ages. Some are self-guided, encouraging the proactive student. Perhaps it is a visit to the Bronte Cutting, designed and excavated nearly a century ago in an early example of geotechnical engineering for transport infrastructure. Or maybe it is a visit to Longreef on the Northern Beaches to design a desalination plant for the future.

These kind of onsite investigations are carefully guided and managed by Kurt who spends a great deal of time and effort to ensure the safety, relevance and efficacy of these trips into geotechnical reality. As students progress through the program the field trips become more developed and advanced, culminating in postgraduate studies. The Masters of Geotechnical Engineering and Engineering Geology offers a comprehensive range of advanced topics for the practicing engineer or engineering geologist. This program is unique in Australian Geotechnical education, attracting students from all over Australia and New Zealand.

As Chair of the School External Relations Committee, Dr Kurt Douglas is committed to industry relevant education, and maintains close professional ties with individual organisations. Industry representatives are invited into his classes to provide students with knowledge that is useful to them. 'Useful' is a word he uses often, and useful is what he wants both his courses and his students to be.



Dr LAUREN GARDNER

Gardner, Lauren Senior Lecturer BS ArchE, MSE, PhD University of Texas at Austin	Research Interests: Network modelling for multi-domain integrated systems: congestion pricing models accounting for uncertainty, the role of real-time information & adaptive pricing; Sustainability models integrating transportation & electricity systems: developing network-based optimization models to predict the role of global transport systems in the spread of contagious disease.
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TRANSPORT ENGINEERING

Dr Lauren Gardner is a young academic, who brings verve and vision into the classroom. She has been a great addition to the School, bringing new knowledge in the area of transport modelling. As an enthusiastic teacher she has quickly become popular with students. She is approachable and takes the time to ensure students understand the content.

To do this she works with a varied teaching methodology. In the courses she teaches, knowledge of applied mathematics and technological advances in modelling are vital learning outcomes. Visual aids are used to support the spoken and written word. Web based learning and simulated gaming are used to provide students with varied pathways to learning. Lauren is committed to providing accuracy amidst this variety. She takes particular care and much time to prepare her classes. Lectures flow into the workshops efficiently, so the complex technical knowledge is communicated clearly and repeatedly. To enhance engagement Lauren ensures that mathematical problems are defined within real world contexts that students can appreciate.



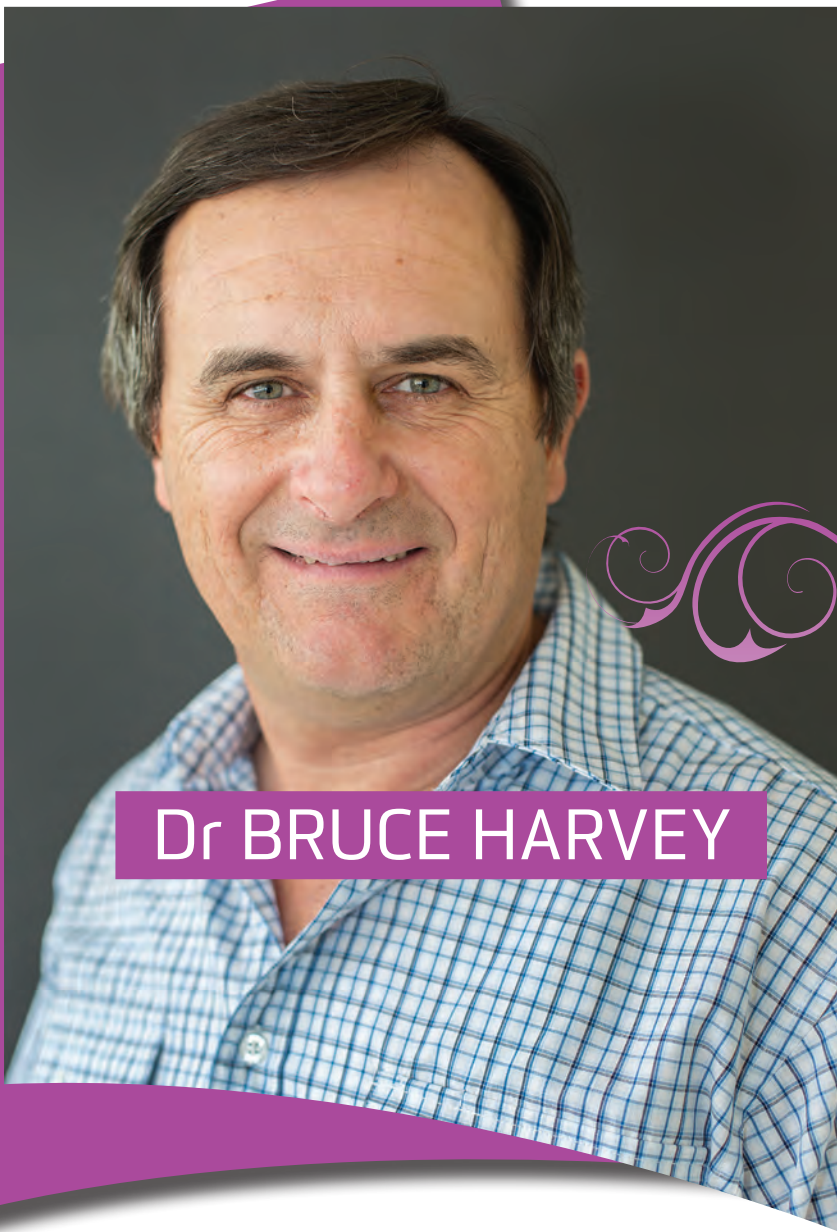
Dr Gardner ensures that mathematical problems are defined within real world contexts that students can appreciate... she hopes her students enjoy their studies as they become critical thinkers...

The use of network analysis for evaluating transport systems is one of her particular interests and areas of expertise. Network science is being used around the world to solve critical transport issues such as the design and evaluation of local and regional infrastructure, specifically regarding sustainability, public health and economic impacts. As a tool to address these issues Lauren teaches an introductory course on optimisation theory which provides engineers with the tools to find the best solution using analytical techniques.

The methods introduced in this course have broad application, well beyond the discipline of engineering, and for budding engineers these skills are of undisputed importance. In this age of fast moving transportation, students of Dr Lauren Gardner will learn skills that can take them anywhere in the world, working in areas such as design, analysis and policy making.

She encourages the pro-active student who can ask the right questions, knows where to look for answers and can solve problems independently and accurately. What she hopes for is that her students enjoy their studies as they become critical thinkers.





Dr BRUCE HARVEY

Harvey, Bruce
Senior Lecturer
BSurv (Hons 1),
GradDip Higher Ed,
PhD UNSW

Research Interests:
Least Squares analysis of
surveying measurements
is my main interest, but I
also investigate alternative
analysis methods & the latest
measurement technologies. Are
there better ways to analyse
surveying measurements &
can we improve Least Squares,
L1 norm & topological grid
searches?

SURVEYING

Dr Bruce Harvey wrote the book on surveying. Literally. Dr Harvey has produced two surveying textbooks, *Survey Computations*, and *Practical Least Squares and Statistics for Surveyors*, that are used widely in both Australian and international universities. Not only is he the source of such highly regarded teaching aids he has ensured that these textbooks are affordable to every student. One is even free online. This is a teacher who cares deeply about his students, their experience, their learning and their ambitions.

Bruce teaches Surveying with a unique depth and rigor, based on real-life experience. Surveying students are highly employable in a broad range of work places. Often working outside in healthy environments, UNSW trained surveyors are working actively in creating legal land boundaries and sub divisions, with builders and architects in the pre-design and design stages of construction, and post construction to measure deformation and potential risk. Bruce is familiar with all of these stages having worked as a surveyor as recently as 2012. He knows what it takes to get his hands dirty.



“If a teacher’s attitude is good then student learning will be more effective. Explain clearly. Know your students, because not one-size-fits-all..”

This kind of commitment to refreshing and refining his skills is also evident in Bruce’s teaching at the School. Each year he takes on the huge task of organising student surveying camps. Academics and students spend time together in the field and around the campfire in an intense but memorable hands-on learning environment. No wonder he won two Faculty of Engineering Teaching Excellence Awards, in 1998 and 2010. He also won a CAUT (Committee for the Advancement of University Teaching) National Teaching Development Project Grant in 1993.

Survey X is another generous offering to committed students who want to walk that extra mile. These are voluntary extracurricular investigations into real life surveying problems, often dealing with new technologies. And Bruce also offers all his students a very tech savvy learning experience. He has produced FIXIT, a custom built software package that guides students through course content. But he didn’t ask anyone else to build it. He coded it himself and is able to revise the system at any time, often incorporating student feedback.

To Dr Harvey, teaching is an art form. Following Socratic and Confucian methods, he can clearly articulate what makes a good, or great, surveying course. “If a teacher’s attitude is good then student learning will be more effective. Explain clearly. Know your students, because not one-size-fits-all. Provide variety with survey camps and practical classes. Involve students. Involve yourself. Consider aims and objectives. Reflect. Evaluate. Respect each other. Be efficient. Know technology and innovation.”

Dr Bruce Harvey provides students with a stimulating and practical learning experience. With 30 years teaching experience he has refined his courses over and over again, knowing that the dryness of theoretical text must be married with images of maps, photographs and plans and with the experience of practice and work in real environments. He aims “to enable students to do deep learning instead of surface learning, so they are able to apply this learning to new problems when they occur in their career.” He listens to students, collating all student comments into one file. This file speaks volumes about his work. Students have repeatedly written about clarity, relevance, practicality and stimulation. And also about how helpful and kind their teacher was.



Dr FIONA JOHNSON

Johnson,
Fiona
Senior Lecturer
BE, PhD UNSW

Research Interests:
climate change impacts on
water resources systems; bias
correction methods that can
be applied to climate model
simulations; models for
design rainfalls & flooding;
questions on stationarity of
large to extreme rainfalls & the
impacts of climate change on
these events & the resulting
implications for engineering
design.



HYDROLOGY AND WATER ENGINEERING

Dr Fiona Johnson is a humanitarian. “I studied engineering so I could solve practical problems and make positive changes to the world around me.” This broad world view suffuses her teaching. “Lots of our undergraduates are idealistic and passionate, wanting to know how they might make a difference in the world. If we can inspire them and give them the skills to affect those changes, then that’s pretty cool.”

But Dr Johnson does not sacrifice pragmatism for her ideals. “While it is good to give students a view of what’s possible, of what’s exciting”, course content is selected on the basis of student needs not personal research passions. Her water engineering programs are designed to stimulate the right kind of thinking, so students begin “thinking like an engineer”. And Fiona knows what this means. She worked extensively as a consulting engineer before commencing her academic teaching career. She knows that the challenges that face engineers are often more than technical. Constraints of practicality, timeliness and cost efficiency also need to be factored in to any viable solution.



“Lots of our undergraduates are idealistic and passionate, wanting to know how they might make a difference in the world. If we can inspire them and give them the skills to affect those changes, then that’s pretty cool.”

So, in her courses on hydrology and water engineering, not only does she teach technicalities and theories, but also the practicalities of the real world. These realities can often be less clear than data, more uncertain than statistics, and it requires understanding of the context of the community in which engineers work.

One very exciting project she offers her first year students deals with just such realities. From UNSW and across the globe engineering students propose answers to questions posed by Engineers Without Borders. These questions emerge from partnerships with non-government organisations in places such as Nepal and Cameroon, where resources are limited. Through a competitive process, the best of these answers are selected and put into practice in places desperately in need of clean and reliable water resources. Through Dr Johnson, UNSW students become part of a worldwide network. They become part of the solution.

Fiona tells her students that undergraduate studies are “the best time of your life”. But that it is about “more than just learning”. For her part, Fiona believes it is her role to gather and harness the passion of novice engineers,

temper and mature it with technical foundational knowledge, then broaden and mature it with real world realities.

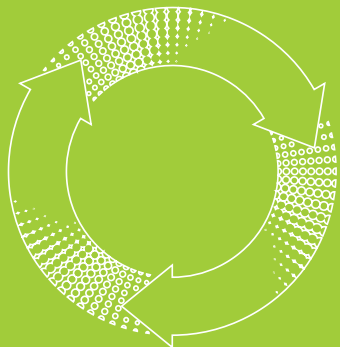
What makes Dr Fiona Johnson such a popular and effective teacher is that she is still excited about what she teaches. Her enthusiasm is infectious. She has great empathy for students with their frustrations and difficulties. She offers them her time, understanding that any student body is diverse, with varied needs. Like her approach to engineering, her approach to teaching is a balance between what is possible and what is practical, between the ideal and the real.

STEPHEN MOORE



Moore,
Stephen
Director,
Environmental
Engineering
Studies
BE UNSW,
MEngSc Adel.,
CPEng, MIEAust

Research Interests:
Development of
environmental material
accounting techniques,
such as Material Flux
Analysis, for regional &
corporate environmental
management systems;
Simulation & decision
analysis applied to waste
management systems.



REGIONAL WASTE AND ENVIRONMENTAL MANAGEMENT

Stephen Moore is an academic with big visions for “designing a sustainable society”. These ideals fuel his teaching at the School. Studying with Mr Moore is an invigorating journey for budding engineers wanting to make this world a better place. They are provided with a chance to be part of the ever broadening field of environmental management, “designing sustainable infrastructure” while satisfying that very human desire to do good works.

These good works are always done by a team. Stephen Moore emphasises collaboration not just as a method but as a principle. “Engineers work in teams, and we should be promoting this to prospective students...there are no (or very few) individual heroes in engineering”. The Engineering industry knows that the ability to work effectively as a member of a team is the most important graduate attribute. And Moore practices what he preaches. He professes the strengths of the team ahead of his own achievements which includes winning a UNSW



“Engineers work in teams, and we should be promoting this to prospective students...there are no (or very few) individual heroes in engineering”

Vice-Chancellor's Award for Teaching Excellence in 2000 and 2015, and School Teaching Initiative Grants from 2014–2016.

Popular with his students, Stephen Moore challenges them to become professionals, but also takes the time to ask students what they need. He constantly checks in with student progress, making himself familiar with each cohort in a way that only a skilled teacher can. Short quizzes at the beginning of each lecture ensure that he knows how students are developing. It also enshrines punctuality as a vital professional attitude. On a more personal note, each year he organises a lunch for selected students, each representing particular needs, and invites them to sit down with him. He asks them the open ended question “how is the course going for you”? Then he listens.

This holistic approach is reflected not only in his teaching methods, but in the course content. Waste and environmental management becomes a collaborative process, not just an abstract environmental concern. This is a community based approach, where the “human need for education, transport, nutrition and even entertainment” are regarded as an essential part of any engineering management program. Such a broad based approach

sets realistic goals that are “materially sustainable”. So studying with Stephen Moore allows students to get their hands-on practical, real life situations, like the Sustainable Design Project, where students are asked to find viable solutions for water, waste, energy and transport infrastructure management at the township of Jabiru.

Currently, Moore is coordinating a team of academics for a student project on Mer Island, in the Torres Strait. “We are engineers, and we need to try to have an appreciation of the social and economic context in which we are providing technical engineering services. We are responding to the needs and wants as expressed by responsible people on Mer Island. It will be an interactive approach... we will not come in on Day 1 with ‘this is your solution’.” Collaboration is at the heart of all Stephen Moore’s work.

This collaborative approach also becomes interdisciplinary, connecting environmental engineering with social sciences, economics and cultural studies. Such an approach means students also broaden their interests, their understanding and their future possibilities for employment.

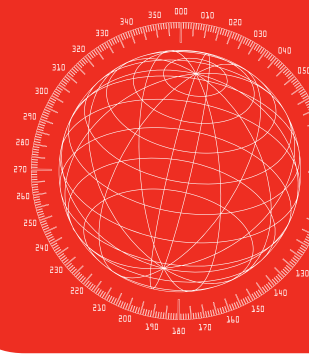
For more information on the Mer Island project, visit www.mer.unsw.edu.au.



Dr CRAIG ROBERTS

Roberts, Craig
Senior Lecturer
BSurv, University
of South Australia,
PhD UNSW

Research Interests:
High precision GPS/GNSS
positioning and leveraging
CORS infrastructure for
practical application to
surveying and geospatial
engineering. The
implications of kinematic
3D datum modernisation
for professional and
mass market users. GPS
for cadastral surveying.
Kinematic positioning with
robotic total stations.



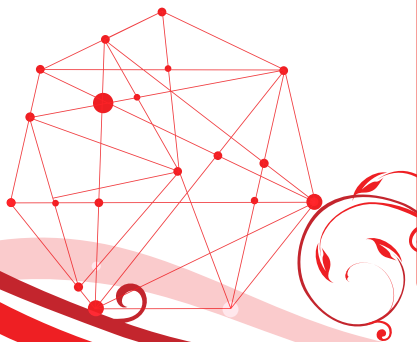
SURVEYING AND GEOSPATIAL ENGINEERING

There are many, many kinds of teachers. Dr Craig Roberts is the kind who is not afraid to use novelty and humour to communicate important ideas. His classes may be transformed into a quiz show, using competition to stimulate learning. Perhaps an impromptu fashion parade to demonstrate appropriate surveying footwear. He has a “constant desire to find new ways of presenting; new media, new exercises and new approaches.” Then he actively searches for student feedback to ensure these innovative methods are “hitting the mark.” This ebullient and entertaining teacher is held dear by students who consistently rate him as an outstanding teacher. It is not only students who appreciate his teaching – industry does as well. In 2015 Dr Roberts was presented with the SSSI (Surveying & Spatial Sciences Institute) National Education Development Award, after having won the NSW Award in 2014.

Nevertheless, Craig’s courses do not sacrifice academic rigor in the name of entertainment. His Surveying experience and expertise is extensive. His teaching and research areas are built around the latest technological advances and he has a

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“Time for meaningful reflection and analysis creates deep learning ... students gain experience in the new technologies”

passion for applying satellite based precision in mapping the real world. He has expert knowledge of the latest technologies: GPS/GNSS, laser scanning and robotic surveying technologies. He humbly calls this his “love of gadgets”.

Similarly, his students gain experience in these new technologies as the school invests in “plenty of gadgets”, including the latest survey grade laser scanners and Unmanned Aerial Vehicles (UAVs). This is the future of surveying and Craig maintains his position at the forefront by attending conferences and seminars, by sitting on industry councils and by sharing with other experts, all in an attempt “to learn what is important and current outside the walls of a university.” In fact this surveying program at UNSW “provides a cutting edge education that is ahead of the industry in some areas: indeed, sometimes, the graduates ‘push’ the industry to keep up”.

Working closely with industry, Craig is also deeply connected to students and their needs. He promotes written and oral communication, research skills and the ability to be both leader and team player. He believes a good teacher “notices” if students are developing these skills. This attention to students is made possible by small classes. From second year on, surveying classes are under twenty, so interesting, hand-on exercises can be done in small groups. Individual feedback is rich. Third and fourth

year surveying camps immerse students in self directed fieldwork. Time for meaningful reflection and analysis creates “deep learning”.

Students are welcome to walk through this academic's door. Craig actively connects with and encourages the student surveying society Survsoc. As many of his graduates head toward leadership positions, he believes it is vital that, as undergraduates, they play in this “sandpit of management”.

A great variety of students come to study surveying at UNSW; school leavers, rural, urban, mature aged, female, international, and it is here they all experience the difference between ‘training’ and ‘education’. This is learning that is more than theory and practice, it is about inter-personal abilities and the personal commitment to professionalism. It is about organising time and resources. It is about passion for innovation. This “boots to suits” profession offers so much opportunity for employment as surveyors are in great demand by allied professionals. And to begin all you need is to “love maths, maps, gadgets and the outdoors”.



Dr JOHNSON SHEN

<p>Shen, Johnson Xuesong Lecturer BEng, MSc Nanjing, PhD Hong Kong Polytechnic University</p>	<p>Research Interests: - Rapid As-Built Field Modelling in Construction; - Sustainable Construction Operations; - Construction Automation and Robotics; - Structural Health Monitoring; - Dynamic Data-Driven Project Management</p>
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CONSTRUCTION

In 2014 Dr Johnson Shen won a Vice-Chancellors Award for Teaching Excellence, as well as a School Teaching Equipment Grant. In 2015 he was also awarded a highly coveted UNSW Learning and Teaching Innovation Grant. These grants are a testament to the School's commitment to innovation and continuous improvement of the student learning experience, and to Dr Shen's leadership in engineering education.

Johnson has purchased for students the most up to date scaled construction equipment models. These movable, remotely controlled models are intricately designed and engineered. They are precise replicas of heavy equipment used on construction sites across the world. Having invested heavily in these models, the School has, at last, solved an industry-wide issue: how to safely train large groups of students in machinery operation and the broader practicalities of construction sites?

Prior to these scaled physical models and construction sites being brought onto campus, student visits to working construction sites were brief and limited in



Johnson's enthusiasm for finding solutions through technology is infectious. His scaled construction site models are worlds worth visiting...

experiential scope. Now, at UNSW, students can gain an ongoing experiential understanding of construction methods and project management through cutting edge robotics. Johnson's enthusiasm for and knowledge in contemporary automation has created an opportunity for students to gain hands-on experience that no other Australian university can offer. And the students love working with these state of the art models.

Visit one of Johnson's classes and you will see students smiling and active while they learn to operate and manage a realistic earthmoving/mining project on campus. The hands-on teaching exercises include how to operate construction equipment like trucks, excavators and loaders remotely, how to estimate total time and cost to complete the construction tasks; how to manage a fleet of equipment that minimises time and cost and maximises construction productivity.

These practical and authentic classes are testament to Johnson's commitment to teaching. He wants to provide students with practical knowledge and hands-on expertise. He wants this to be achieved safely without sacrificing authentic experience. He wants learning to be pleasurable and rewarding for students who are drawn

to the big world of construction, a world that has been heretofore unavailable until after graduation.

Dr Shen's expertise in construction automation and information technologies combined with his devotion to the warmth of student-teacher interaction creates a complete learning environment. His enthusiasm for finding solutions through technology is infectious. His scaled construction site models are worlds worth visiting and past students have testified to the fact that learning can be done with a smile.

Professor IAN TURNER



Turner, Ian
Professor
BSc (Hons) USyd,
MEnvEngSc
UNSW, PhD USyd,
MIEAust, MAGU

Research Interests:
Coastal Engineering &
Coastal Management;
Innovative coastal
measurement & monitoring
techniques; Sediment
transport at the beachface;
Modelling of coastline
variability & change
spanning storm, seasonal,
annual & decadal time-
scales; Assessment of
coastline adjustment to a
changing climate.



WATER RESEARCH

Professor Ian Turner is achieving the goals he set for himself as a research engineer, leading a talented team of Postdoctoral and PhD researchers, and just recently having taken up the role of Director of the School's Water Research Laboratory (WRL), the largest coastal hydraulic research facility in Australia, and one with long-standing links with industry.

His teaching courses offer students a chance to be a part of the burgeoning field of coastal engineering. This is a relatively new area of civil engineering. But it is an ever broadening field that is ripe with opportunity as it becomes increasingly important to maintain coastline integrity where subtle changes in climate are creating drastic changes in reality. With such broad possibilities, students can look forward to an occupation that is serviceable and rewarding on many levels.

What Ian offers students is not only his expertise in coastal engineering, but an exemplar of research success. He believes that teachers should "be an example of what they teach". He is attuned to his own behaviour in the classroom. Aware of both the powers and responsibilities of a teacher, he seeks to manage the classroom with a



...creative enthusiasm is what charges Professor Turner's engineering courses with life, and it is what charges his own life as a water engineer...

respectful demeanour that is never authoritarian. As a mentor he accepts he has influence over younger minds and this power is balanced with a conscientious effort to be approachable and fair.

Ian keeps his teaching fresh and up to date, drawing upon 10 years of practical experiences gained while working with industry, prior to taking on a full-time teaching and research role in the School. 'Universities are evolving changing places,' he says. 'UNSW is a highly ranked university internationally, and the School of Civil and Environmental Engineering is particularly well regarded.'

He also leads and coordinates the School's participation in the Faculty-wide 1st Year course 'Engineering Design and Innovation' where new students are given practical, hands-on experience about what it means to be and think like an engineer, and introduced to engineering teamwork. The subject itself is team-taught by Ian and his colleagues: a classic example of the co-operative environment the School offers. But it is the creativity offered to the students by their academic mentors that fuels this unit. This creative enthusiasm is what charges Ian's engineering courses with life, and it is what charges his own life as a water engineer.

Ian receives excellent review from students, from first years learning about engineering creativity, to the Honours students he supervises who are refining their studies and becoming more independent. As a teacher who truly knows how to lead, he knows when to direct and guide a student and when to let them be. His teaching has been honed over many years and yet it still affords him great satisfaction because he believes in what he teaches.





STUDENT SERVICES

For Student Services Manager, Kristy Guia, a respectful relationship to students is a high priority – to relate with friendliness and approachability.

When students feel lost or confused, the Student Office knows how to help, what information to gather, what advice to provide.

The administration of applications, admissions, term planning, course requirements, room bookings, complaints, examinations, identifying graduates and all other student requirements is an awesome task but one handled smoothly by the CVEN team of administrative officers.

The office that houses this experienced and capable team is centrally located on the fourth floor in the Civil and Environmental Engineering building and is its beating heart. Many of the administrative officers and assistants have been here for many years - a testament to the collegial and supportive professional environment of this School.

Front of house is managed by the iconic figure of Les Brown. Brown has helped students find their way for twenty two years. His friendly humorous approach combined with his wealth of experience and knowledge make him an invaluable asset to the School. But he is part of a much larger team who are calmly capable of maintaining the smooth running of the School for all; students, academics, alumni, visitors and staff. Behind the scenes professional staff work solidly in the fields of finance, IT, HR, external communications, and OH&S.

For Student Services Manager, Kristy Guia, a respectful

relationship to students is a high priority – to relate with friendliness and approachability. Student problems are listened to and understood. Language difficulties are handled with kindness and strategic experience. A commitment to teamwork, a marked characteristic of the School, ensures that individual administrators are supported during demanding times. This is an adaptable team: taking on different tasks at different times of the year, whether it is enrolments or examinations, so that information can flow freely and students can feel confident they are receiving the correct and most up to date information.

L-R: Lena Comino, Kristy Guia, Renata Melis, Les Brown, Hannah Rizzo and Patricia McLaughlin



