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University**FACULTY OF SCIENCE
AND ENGINEERING****1 November 2018****Suggest a story >**

From the Dean

NEWSLETTER

Dear FSE Research Communication

Our trial of Australia's first 'bush university' is complete, with fourteen students graduating from the Wuyagiba Regional Study Hub on 15 October, and sitting alternative entrance exams at Macquarie. This is an important milestone in Emilie Ens' work in this community, working closely with local community members to identify how we can bridge the gap in tertiary education in South East Arnhem Land. My thanks to everyone involved in the project.

How do you feel about the insects and spiders living in your home? Lizzy Lowe and Scott Wilson want to know about your creepy-crawly house guests, how you feel about them, and what you do to control them. By [taking part in their survey](#), you will help them develop guidelines for people to effectively and safely manage insects and spiders around their homes.

In other research news from our Faculty: lizards learn to use different colours and shapes to find food; Jemma Geoghegan has proposed a new framework to better understand how the harmfulness of viruses evolves when they jump to a new host species; and the devastating disease burden associated with elevated blood lead levels in India. Almost one in five Australian honey samples were found to be adulterated; and rivers within the Murray-Darling Basin have significantly declined in size and flow over the last 100,000 years.

Congratulations to Ian Paulsen whose bid for a Centre of Excellence in Synthetic Biology has progressed through the expression of interest stage. Congratulations also to Judith Dawes and Rich Mildren who were recently elected to The Optical Society's 2019 Fellows Class. And to Michael Swain and Katie de Luca who received awards at the Australian Chiropractors Association's National Conference.

Read on for information about the six new staff who have joined Engineering, Mathematics and Statistics, Physics and Astronomy, and Computing in the past month,

the three vacancies we're currently advertising, and two public lectures with Dr Karl and Moyal Medal winner Noel Cressie.

If you want to know more about what's happening across the Faculty, follow our Faculty Twitter account [@MQSciEng](#) and my personal account [@BarbaraMesserle](#). If you've got news to share, please tweet about it and include our Faculty handle so we can see it and retweet. If you're not on Twitter, then email us at fse.execdean@mq.edu.au and we'll share the news.

Regards,

Barbara

In this bulletin

- [Australia's first 'bush university' launched in Arnhem Land](#)
- [How do you feel about the insects and spiders living in your home?](#)
- [Lizards think outside the square to get their meals](#)
- [Lead exposure linked to devastating intellectual disability in children](#)
- [Understanding how the virulence of viruses evolves](#)
- [Almost one in five Australian honey samples adulterated](#)
- [How the rivers run](#)
- [Official launch of AAO-MQ](#)
- [Academics named OSA 2019 Fellows](#)
- [Chiropractic conference success](#)
- [Future STEMM Leaders graduate](#)
- [Garden celebrates 40th anniversary](#)
- [Research in tweets](#)
- [Faculty news and notices](#)

Australia's first 'bush university' launched in Arnhem Land



Macquarie University and South-East Arnhem Land communities have partnered to establish Australia's first 'bush university' at the remote outstation of Wuyagiba, which lies on the western coast of the Gulf of Carpentaria.

The Wuyagiba Regional Study Hub, which was launched in September, provides opportunities for remote Indigenous students to access university education and creates a means for Elders to sustain high-level Aboriginal knowledge in the region.

A six-week trial of the Study Hub has been completed, with the first intake of 25 students from Ngukurr beginning a cross-cultural bridging course to prepare them for tertiary education.

Fourteen students graduated in a ceremony in Ngukurr on 15 October. In the last week of the trial, the 14 successful students travelled to Macquarie University to sit alternative entrance interviews with Walanga Muru and other Macquarie University staff.

The Wuyagiba course combined traditional knowledge and transferrable skills including essay writing, computer skills, filmmaking and translation from local Kriol to English.

A new open-air classroom facility was constructed by locals and Environmental Sciences' Ben Kitchener and Emilie Ens to host the Tertiary Preparation Course classes, which were run by local Elders, Macquarie University lecturers and current Macquarie University undergraduate students from Ngukurr, Melissa Wurramarrba and Ernest Daniels.

"This locally developed course is designed to bridge the gap in tertiary education in South East Arnhem Land," says Emilie, who is the project co-convenor.

"Through my 10 years of work in this community I have worked closely with local community members to identify how we can address the gaps and hurdles to tertiary education for this mob.

"The trial has also allowed us to identify what works and doesn't work in terms of course material and the facility so in following years we can continue to improve the course and outcomes."

Next year's Wuyagiba Study Hub students are already lining up and other Aboriginal communities have shown interest in starting their own Tertiary Study Hub following this locally-grounded model.

[Find out more](#)

[Watch the Bush University in action](#)

How do you feel about the insects and spiders living in your home?



Do you love or loathe your creepy-crawly house guests? Are you an insecticide at the ready kind of person? Or do you take a more live and let live approach?

Researchers from Macquarie University and the University of Sydney want to know about the insects and spiders living in and around your home, how you feel about them, and what you do to control them.

By taking part in their survey, you will help them develop guidelines for people to effectively and safely manage insects and spiders around their homes.

“With summer just around the corner, it’s the time of year you may start noticing more insects and spiders around your house and garden,” says urban ecologist and research leader Lizzy Lowe from the Department of Biological Sciences.

“There are many different ways people deal with these critters. They may not bother you or you might hate the sight of them!”

“We want to know what spiders you’re spotting, and what insects have invited themselves to your place,” says entomologist Tanya Latty from the University of Sydney.

“By taking part in our survey, you will be providing us with valuable data we can use in our research, and helping us build a picture of how people around Australia are

keeping the bugs at bay.”

“We will use the results of the survey to publish guidelines about which insects and spiders are a risk around the home, and how to control them in a safe way,” says ecotoxicologist Scott Wilson from the Department of Environmental Sciences.

[Take part in the survey](#)

Photo by Jim McLean.

Lizards think outside the square to get their meals



Lizards learn to use different colours and shapes to find food and actually refine their approach based on the information they are given, according to research published by the Lizard Lab.

The study, published in *Animal Behaviour*, shows that tree skinks are able to use the new colours as well as shapes to find a food reward by using behavioural flexibility.

Researchers first trained individuals of the family-living Australian tree skink to find food associated with a specific colour and then tested how they react when this colour suddenly does not lead to food anymore.

Lizards were either shown a different colour or completely new shapes—the skinks had to learn to adapt to these changing conditions and use the new cues to find the food.

“The impact of humanity on the lives of many species is no secret, and the ongoing change in the species composition within a given habitat has animals facing new challenges such as changes in food availability,” says lead author Birgit Szabo from the Department of Biological Sciences.

“The physical world is an ever-changing place and although animals have adapted to the environment they live in, they are not prepared for everything that comes their way,

and a simple way for these animals to survive is to be able to quickly adjust behaviour to these changes.

“We already knew that behavioural flexibility is a common ability in primates and many bird species, but so far evidence in reptiles is scarce. Our study will help to disentangle how evolution has shaped intelligence in different species.”

[Find out more](#)

Lead exposure linked to devastating intellectual disability in children



The devastating disease burden associated with elevated blood lead levels in India has been revealed in new Macquarie research.

The results of the first ever meta-analysis of blood lead levels in India found the burden of disease to be significantly larger than previously calculated, with negative outcomes on intellectual disability measures in children.

The research calculated the pooled mean blood lead level from data published between 2010 to 2018 to estimate the attributable disease burden in IQ loss and Disability Adjusted Life Years (DALYs). The DALY is a measure of overall disease burden, expressed as the number of years lost due to ill health, disability, and early death.

Previous studies have estimated 4.6 million lead-attributed DALYs and nearly 165,000 deaths, far fewer than reported by the new study, which found that the total could be as high as 4.9 million DALYs, or, in other words, 4.9 million years lost due to ill-health, disability or early death as a result of high blood lead levels.

At low levels, one $\mu\text{g}/\text{dL}$ of lead contamination in the blood causes more than half a point of IQ loss.

For children living in India, whose blood lead level contamination is at almost 7 µg/dL, the impact on IQ is significant, explains lead author Bret Ericson of the Department of Environmental Sciences and Pure Earth, New York.

“At a societal level, the bell curve of IQ shifts to the left, with more people falling into the intellectually disabled category, and far fewer in the gifted category. The potential impacts on a country’s productivity and associated disease burden are, therefore, significant.”

[Find out more](#)

Photo by [Alex Proimos](#).

Understanding how the virulence of viruses evolves



A new framework to help evolutionary biologists better understand how the harmfulness, or virulence, of viruses evolves when they jump to a new host species has been proposed by a Macquarie researcher.

The paper, published in *Nature Reviews Genetics*, suggests adopting a phylogenomic approach.

Phylogenomics is the joining of evolution and genetics. It involves reconstructing evolutionary relationships by comparing whole genome sequences.

“With recent advances in real-time genomics during disease outbreaks and the increased demand for precision in public health interventions, we believe this will help develop a new understanding of how the harmfulness of pathogens evolves,” says lead author Jemma Geoghegan from the Department of Biological Sciences.

“We’re hoping this work may contribute to new strategies allowing us to better control and eradicate pathogens.

“It also has the potential to inform and improve the fields of disease management, and the biological control of invasive pests.”

“It’s not feasible to predict where and when a new disease might emerge because of the immense complexities involved,” she says, “but using this framework, it might be possible to predict how the virulence of a virus will evolve in a new host species.”

[Read the paper](#)

Photo of Ebola virus particles on the surface of a VERO cell by [National Institute of Allergy and Infectious Diseases \(NIAID\)](#).

Almost one in five Australian honey samples adulterated



New and independent research has found almost one in five Australian honey samples has been adulterated with cheaper sugar products, such as corn syrup or sugar cane.

Conducted by Macquarie University in collaboration with the National Measurement Institute, the new research was published in *Scientific Reports*, and was undertaken using the only internationally-accepted testing method.

The study revealed adulteration is a persistent global problem, although Australian honey products were found to be the least adulterated at 18 per cent, while 28 per cent of European honey and 52 per cent of Asian honey were found to be fake.

Of concern, the two samples of New Zealand manuka honey tested as part of the study were found to be adulterated.

“Each year, there are 10,000 tons of New Zealand’s manuka honey sold globally,” says lead author Mark Taylor, from the Department of Environmental Sciences.

“New Zealand only produces 1,700 tons annually, so it’s not hard to do the maths and see there is a problem with the product being sold.”

Honey is considered the world's third most adulterated food, with additions of cane, rice sugar and corn syrup, along with mislabelling of its geographic origin, being common fraudulent practices in the honey market.

"The findings all point to the same thing: that we need better regulations to ensure customers can have confidence in the product they are being sold," says Mark. "Currently, consumers are paying for a product that is not what it says it is on the label."

[Find out more](#)

How the rivers run



Rivers within the Murray-Darling Basin have significantly declined in size and flow over the last 100,000 years, according to new research from the Department of Environmental Sciences.

"We found that some rivers had channels up to 12 times wider, and carrying up to 270 times the flood discharge of their modern equivalents," says lead author Paul Hesse.

"And for the first time we've demonstrated that temperature is a principal driver of river flow, rather than changes in precipitation."

The researchers used modern rainfall and river flow data to examine the climatic drivers of river flow and the size of the river channels, and derived an equation to best describe the relationship between rainfall and river flow.

They used this to predict hydrology for ancient rivers across the Murray-Darling Basin from the large ancient channels still visible on the surface of the alluvial plains.

"This research is impactful as it uses knowledge of the past as a window for the future," says study co-author Tim Ralph.

"The Murray-Darling Basin is Australia's food bowl, and so understanding the key

drivers of river hydrology is imperative now and into the future.

“Our work suggests that the Murray-Darling Basin river system is likely to be highly sensitive to future temperature change.”

The research was published in *Quaternary Science Reviews*.

[Read the paper](#)

Photo of the Darling River (foreground) and one of its old channels (rear).

Official launch of AAO-MQ



It was great to welcome NSW Chief Scientist and Engineer Professor Hugh Durrant-Whyte to Macquarie for the official launch of AAO-Macquarie on 12 October.

We're very proud to have assumed responsibility for the research and optical instrumentation capability of the new AAO, and to have AAO-Macquarie as one of the departments in our Faculty.

AAO-Macquarie brings to the university a strong partnership with the University of Sydney, the Australian National University, and Astronomy Australia Limited through the formation of Australian Astronomical Optics, a collaborative national capability for astronomical instrumentation.

Their capability in optical design and assembly is synergistic with sensing interests in biology, medicine, environmental science and engineering; and complementary expertise in lasers, waveguide fabrication, and astrophotonics.

In turn, the university will provide opportunities for AAO-Macquarie staff to access broader research and teaching collaborations, technical capabilities, and career opportunities.

Academics named OSA 2019 Fellows



Congratulations to Physics and Astronomy's Judith Dawes and Rich Mildren who have both been elected to The Optical Society's 2019 Fellows Class.

The Optical Society (OSA) is the leading professional organisation for people involved in the science of light.

"I am delighted to be nominated for this honour," says Judith. "The fellowship is for my research on lasers and laser applications in medicine and dentistry, and my contributions to optics and physics education."

"I very much appreciate the recognition that this gives to our research over many years in the MQ Photonics Research Centre."

Rich says having OSA Fellows at Macquarie increases the university's international profile in this area.

"I believe we now have six OSA Fellows (with Jim Piper, Brian Orr, Michael Withford and Deborah Kane elected in previous years), showing a great depth of outstanding optics expertise that will help attract future high quality students and staff."

Chiropractic conference success



Congratulations to Chiropractic's Michael Swain and Katie de Luca who both received awards at the Australian Chiropractors Association's National Conference in Hobart.

Over 200 practitioners from across Australia attended the conference and heard a range of presentations about the theme of 'Positive Aging'.

Michael was awarded the first prize for his podium presentation on expectations and short-term improvement in low back pain.

By analysing data from the Nordic Maintenance Care clinical trial, he and his collaborators found that the recovery expectations of patients with chronic or recurrent low back pain are associated with improvement in their pain at their fourth visit, regardless of interventions.

Michael also received the first prize poster presentation for a project looking at pain in Australian adolescents.

Pain in adolescents causes huge economic and health burdens globally. The research found that pain is common in Australian adolescents and is associated with psychological symptoms but not social disadvantage.

Katie was awarded the second prize podium presentation and the second prize poster presentation.

Her podium presentation looked at how multisite joint pain in older Australia women is associated with poorer psychosocial health and greater medication use.

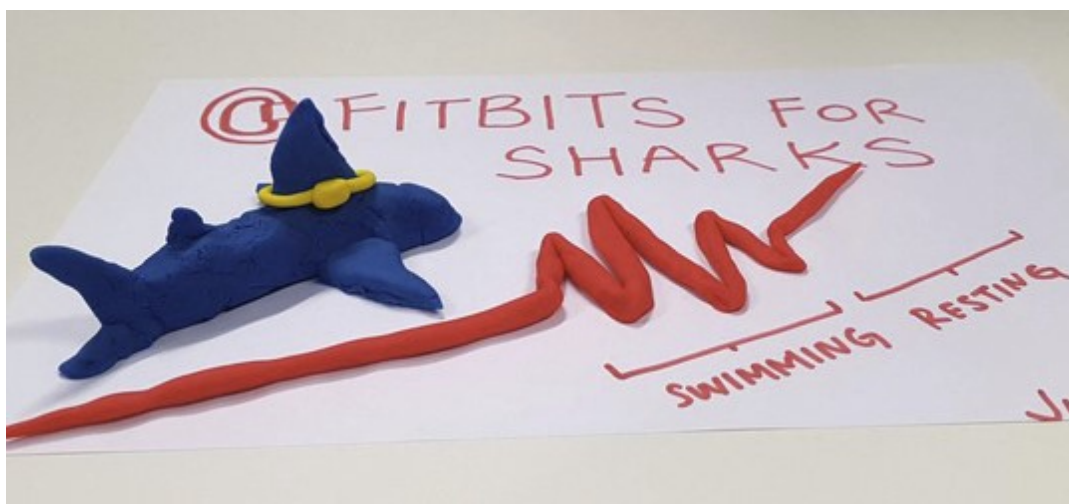
Her winning poster looked at characteristics of chiropractors who manage people aged 65 and older.

Katie also gave an invited keynote presentation entitled 'Getting to know your Grandma—understanding back pain in the older patient', and was awarded a grant from the Association to fund the Australian arm of the BACE trial—a multinational practice-based trial designed to investigate chiropractic management of low back pain in people over 65 years of age.

Thank you to all our Chiropractic academics who participated in the conference and

represented the Faculty so well. Macquarie was responsible for five of the eight podium presentations and four of the 14 posters.

Future STEMM Leaders graduate



Eight PhD candidates from our Faculty have graduated from the Future STEMM Leaders program.

Victoria Graham, Julianna Kadar, Michael Forster, Md Mohasinul Haque, Jandson Santos Ribeiro Santos, Christine Harper, Sebastian Murk and Gustavo Thomas were all part of the program's inaugural class.

Future STEMM Leaders is the brainchild of the Faculty of Medicine and Health Sciences' Hossai Gul.

"I developed the program because I started my PhD earlier this year, and I craved a professional development program that would teach me skills that are not explicitly included in a PhD candidature," she says.

"I also wanted a group of like-minded PhD peers to connect with and learn from, and also to connect the three STEMM faculties of the Faculty of Medicine and Health Sciences, the Faculty of Science and Engineering, and the Faculty of Human Sciences."

So far, the program has been a great success. The 16 graduates all completed with 100 per cent attendance and participation.

"To put that in perspective, it is almost unheard of for PhD students to commit to 18 hours+ professional development within a four month period," says Hossai.

As for the longer term impacts, she is hoping the program will disrupt the notion that a PhD should be just about completing a project.

“If the student completes the project but has had a bad experience, cannot find job within academia or industry, does not know their next steps post-doc, cannot communicate to the public about their work, or lacks the ability to self-reflect and engage in discourse—then how useful was that PhD really?”

Hossai hopes the program will also encourage more gender-balanced and culturally and linguistically diverse leadership in STEMM.

“Our program participants and facilitators were both gender-balanced and culturally and linguistically diverse so the logic is if we build the capacity of our diverse PhD candidates then hopefully that will translate into a more diverse leadership landscape in the future.”

[Follow Future STEMM Leaders on Twitter](#)

Photo above by Julianna Kadar is from a data visualisation workshop where candidates used Play-Doh to visually distil the key message from their PhDs.

Garden celebrates 40th anniversary



The Frank Mercer Biological Sciences Garden is celebrating its fortieth anniversary this year.

Named in honour of the founding Head of Department for Biological Sciences, the garden is a key component of the Evolutionary History Walk.

The Department held a celebration of the garden in September. Thanks to everyone who contributed to the event, it was fascinating to learn more about the garden's history and the important role it plays on our campus today.

[Find out more about the garden](#)

Research in tweets

We've been sharing snippets of our recently published research and Faculty members being mentioned in the media on Twitter.

Here are some recent highlights from [@MQSciEng](#).

RT @Macquarie_Uni: One month on from the #earthquake and tsunami which rocked #Sulawesi, authorities are still trying to recover and rebuild. [Natural hazards expert @AndeGiss takes a look at the island's response - and the key lessons we need to learn](#) #LighthouseNewsflash

RT @BeaCurious: Find yourself waiting for the centrifuge to finish or the water bath to heat your samples? [Check out my list of productive things to do in these short snippets of time in the lab](#) #PhDchat #labwork @MQSciEng

[Scientists \(including @MqEPS' @April_Abbott\) map 'feeding stop' seamounts off Tasmanian coast](#) QT @April_Abbott: Great to have the media interest!!! #marinescience #mudrocks #seamounts #RVInvestigator #WomeninSTEM @MqEPS

RT @computing_mq: [Check out the awesome video #Engenesis created for the 2018 @BigDataSocAU #blockchain hackathon!](#) @amin_beheshti @fredamouzgar @MQSciEng @hackaus @AgateChain @AWS @sas_anz

"You're replacing an entire bit of marine habitat with an island, so you're just losing animals no matter what you do," says @EnvScMQ's @DrKDafforn QT @SmithsonianMag: [What if we could make blue islands?](#) A think tank has proposed an idea for an artificial island built from land reclaimed from the sea that could house up to 1.1 million people.

RT @jr4science: Do invasive species use information from conspecifics and native species as a way of learning about their new environment? [Check out our paper](#) exploring if learning may impact wall #lizard #invasion success #herpetology #cognition

RT @Dr_Andrew_Care: It was a lot fun to sit down with @Dennis_Johanna and chat about our research on #VitalCast I highly recommend tuning in to hear us and other @Sydney_Vital members discussing their exciting #CancerResearch @cancerNSW @MQMolSci @MQSciEng @CNBPscience QT @Sydney_Vital: This week on #VitalCast @Dr_Andrew_Care discusses how protein-based nanoparticles can be engineered to treat cancer + he's joined by special guest and one of our scholarship awardees @Dennis_Johanna [Listen here](#)

Listen to @MQMathsStats' @sophluidynamics talk about the mathematics of murderers QT @RadioNational: [The mathematics of murderers](#): Is there an unconscious method to the madness of a serial killer?

RT @DocPJHarvey: [Recently published work from my time at @EnvScMQ looking at residential soil contaminants](#). Thanks to co-authors @PhoebeGPeterson and Mark Taylor #soil #pollution @SpringerNature @MQSciEng @AusSMC #health #exposure #australia #citizenscience

[How a brain the size of a sesame seed could change AI forever](#): Honey bees "have concept learning; they have lifelong memory; they can plan; they can plot incredibly efficient foraging routes over kilometres" says @MQBiology's Andrew Barron

RT @Macquarie_Uni: Macquarie University has helped bring the existence of the tunnel to light, using captivating drone footage to create a 3D reconstruction! QT @smh: [Exclusive: First pictures of secret tunnel in cliff face below Macquarie lighthouse](#)

RT @urchinhunter: Our latest paper @MEG_MQ @MQSciEng @MQ_Marine @MQBiology QT @Ioutosetto: [Our new paper!](#) Acclimation time in behavioural experiments is important and should be considered prior to starting any animal personality experiments @MEG_MQ @FishLab_MQ #behaviour #science @MQBiology

Faculty bulletin

New staff | Current vacancies | Staff Wellbeing Week | Moyal Medal Award and Lecture | Public Lecture with Dr Karl

Welcome to new Faculty staff

A warm welcome to all the new staff who have joined the Faculty in the past month.

Please join me in welcoming **Shuying Wu** who joins Engineering as a Senior Lecturer from the University of New South Wales.

Mathematics and Statistics has two new staff members. **Lyndon Koens** is a Lecturer in Applied Mathematics from the University of Cambridge, and **Julian Bailey** is a Research Associate joining us from the Australian National University.

Samyaday Choudhury joins Physics and Astronomy as a Postdoctoral Research Fellow from Yonsei University Observatory.

And Computing has two new Postdoctoral Research Fellows. **Minhui Xue** from East China Normal University and **Shoujin Wang** from Vantage FX.

Current vacancies

We're looking for a [Lecturer in Cyber Security](#) to join an innovative and multidisciplinary team in the Department of Computing, contributing to research in areas such as privacy preserving technologies, human-centric security, cyber physical systems security and applications of AI in cyber security.

We're seeking a suitably qualified [Postdoctoral Research Fellow](#) to work on different aspects of privacy enhancing technologies, also based in the Department of Computing.

And we have an opportunity for a [Postdoctoral Research Fellow](#) to join a multidisciplinary team within the Department of Molecular Sciences working on ARC Discovery Project 'Reverse Chemical Proteomics: Harnessing Yeast Display for Drug Discovery'.

Staff Wellbeing Week

Are you taking care of yourself, your body, your mind, your family and work life? Make today the start of your journey to be a better you. Improve your wellbeing so you can function optimally at work and take a better version of yourself home.

Staff Wellbeing Week **runs until Thursday 1 November**. [Find out more about the week](#)

Moyal Medal Award and Lecture

The Moyal Medal Committee invites you to attend the lecture and presentation of the 2018 Moyal Medal to Professor Noel Cressie from the University of Wollongong on **Thursday 1 November**.

In conjunction with this award, Noel will be giving a lecture entitled 'Statistics, Mathematics, and Rocket Science'.

Too much carbon dioxide in the atmosphere is a threat to the long-term sustainability of Earth's ecosystem. Atmospheric CO₂ is a leading greenhouse gas that has increased to levels not seen since the middle Pliocene (approximately 3.6 million years ago). One of NASA's remote-sensing missions is the Orbiting Carbon Observatory-2, whose principal science objective is to estimate the global geographic distribution of CO₂ sources and sinks at Earth's surface, through time. This starts with the measurement of radiances from individual soundings and moves on to retrievals of the atmospheric state, including CO₂-related variables.

[Find out more about this event](#)

Public Lecture with Dr Karl Kruszelnicki

Join us for a wonderful evening with Dr Karl on Tuesday 4 December, who will take us on an amazing optical adventure!

Dr Karl Kruszelnicki just loves science to pieces. After all, science is a way to not get fooled. Dr Karl's media career spans more than 30 years, talking about science in radio, TV, newspapers, and books – 44 to date with more on the way. His accolades range from the Ig Nobel Prize from Harvard University for his groundbreaking research into belly button fluff and why it is almost always blue, to being one of Australia's 100 National Living Treasures.

[Find out more about this event](#)

Connect with us

If you have comments, questions or research news you think might be of interest to the rest of Faculty, I'd love to hear from you. Drop me a line at fse.execdean@mq.edu.au.

Connect with your Faculty online:

- Website: science.mq.edu.au
- Faculty on Twitter: [@MQSciEng](https://twitter.com/MQSciEng)
- Barbara on Twitter: [@BarbaraMesserle](https://twitter.com/BarbaraMesserle)

Got a story?

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