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University**FACULTY OF SCIENCE
AND ENGINEERING**

February 2018

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From the Dean

NEWSLETTER | FEBRUARY ISSUE

Dear Suzannah

I've just returned from Canberra where I was one of 240 scientists taking part in Science meets Parliament. It was an excellent opportunity to talk directly with our elected officials about the importance of our sectors and the contribution they can make to politics.

I was pleased to be part of a strong Macquarie contingent including Biology's Lesley Hughes and Phil Taylor, Sophie Calabretto from Mathematics, Judith Dawes and Shima Taheri from Physics and Astronomy, Lindsay Parker from Molecular Sciences, and Luan Heimlich from Engineering. I'm sure we all got a lot out of participating in the event.

Assistant Minister for Science, Jobs and Innovation, Senator Zed Seselja, also used the opportunity to announce the national grants for Science Week. Congratulations to the National Indigenous Science Education Program and the Department of Physics and Astronomy who both had projects funded.

There's plenty more news you can read about in this month's newsletter, including: the launch of our Entrepreneurial Enrichment PhD Program; how PACE has helped one former student kickstart her career; and our latest research findings from a novel way to collect whale microbiota, to tracking lead contamination in NSW bees and their honey, and how fibre-optical telecommunications are helping scientists peer into deep space.

If you want to know more about what's happening across the Faculty, follow our Faculty Twitter account [@MQSciEng](#) and my personal account [@BarbaraMesslerle](#). 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 me at fse.execdean@mq.edu.au and we'll share the news.

Regards,

Barbara

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FSE meets Parliament



It was great to attend the recent Science meets Parliament gathering in Canberra, particularly with such a strong Macquarie contingent (Macquarie is also one of the sponsors of the event).

I was joined by Biology's Lesley Hughes and Phil Taylor, Sophie Calabretto from Mathematics, Judith Dawes and Shima Taheri from Physics and Astronomy, Lindsay Parker from Molecular Sciences, Luan Heimlich from Engineering, and our Faculty of Arts colleague Ronika Power.

Run by Science and Technology Australia, the two-day event connects decision-makers with Australia's leading scientists to promote the role our sectors can play in politics. There was professional development, a gala dinner in the Great Hall at Parliament House, and face-to-face meetings with politicians.

I got the opportunity to speak to Brian Mitchell MP, the member for Lyons in Tasmania, about research funding longevity, industry interactions with universities, and training.

At the event, Assistant Minister for Science, Jobs and Innovation, Senator Zed Seselja, also announced the national grants for Science Week. I was pleased to find out the Faculty has received two grants.

Congratulations to the National Indigenous Science Education Program who will be celebrating Indigenous and Western science at the Indigenous Science Experience @ Redfern, and the Department of Physics and Astronomy who will be hitting the road for Pocket Astronomy in Pocket-sized Towns and visiting four towns in regional New South Wales over four days.

Entrepreneurial Enrichment PhD Program launched



Our PhD students will have the opportunity to learn how to use their research ideas to help grow a start-up, with the launch of our Entrepreneurial Enrichment PhD Program (EEPP) earlier this month.

A group of 10 students (working in teams) are taking part in the pilot program over the next six months.

They will receive a stipend to do this work outside their PhD studies, and be mentored by social entrepreneurs Dorjee Sun and Selena Griffith in what promises to be a fast-paced but highly nurturing environment.

They will learn how to form teams, develop great ideas into a commercially-viable products and partner with investors.

As Selena said at the launch, stepping into the real world, developing your own self-guided business, and seeing what that's like, is an opportunity you don't normally get when doing a PhD.

It's about understanding that the research they're undertaking has potential commercial value, she said, and it's possible for our students to create their own businesses to capitalise on that.

It was great to hear about the ideas our students are working on at the program launch.

They include building sustainable communities, developing investment strategies that will minimise human involvement in decision-making by using algorithms, creating a delivery system for precision pesticides, and building better cryptocurrency companies.

Watch this space!

Mapping a decade of widespread movements of our iconic sea species



A new study led by researchers at the Integrated Marine Observing System (IMOS) and the Department of Biological Sciences has tracked the whereabouts of 117 marine species, ranging from sharks and saltwater crocs all the way to sea turtles and dugongs.

The research, published in *Scientific Data*, is helping to unravel the widespread movements of Australian marine species, and provide insight into the natural habitats, distributions and changing behaviours of these animals in the face of climate change.

"The data gives an in-depth picture of the behaviour of these animals over the 10 years of the study enabling us to predict how behaviour might change in the future," explains Macquarie's Rob Harcourt, who is also the leader of the Animal Tracking Facility at IMOS.

“For example, in the case of bull sharks—a species we tracked that is known to be potentially dangerous—research has shown that they move within warmer waters, meaning it is important that we understand how they modify their movements in response to changes in ocean conditions and processes.”

[Find out more.](#)

Photo by [amanderson2](#).

Fibre-optical telecommunications helping scientists peer into deep space



Researchers have demonstrated that a stable frequency reference can be reliably transmitted more than 300 kilometres over a standard fibre-optical telecommunications network.

Their new method enables widely-separated telescopes used for high-resolution radio astronomy to be synchronised.

The research, published in *Optica*, shows the successful transmission of a stable frequency reference between two radio telescopes via a fibre link and demonstrates that the technique's performance is at least as good as using separate atomic clocks at each telescope. The paper was written by a consortium involving the Department of Physics and Astronomy's Yabai He and Brian Orr.

This will potentially allow scientists anywhere to access the frequency standard by tapping into the telecommunications network.

[Find out more.](#)

Photo by CSIRO / D. Smyth.

Tracing lead contamination in NSW bees and their honey



A new study, published in *Environmental Science & Technology* last month, is the first Australian research of its kind to trace the source of contaminating metals, including lead, in honey bees and their products.

Specifically, the researchers used an isotopic source tracing method to analyse contaminating metals in soil and dust in Sydney and in Broken Hill, and for the first time, in bees, as well as their honey and wax.

“The results were unequivocal—they showed clearly the different sources and origins of lead across the study areas,” says Environmental Sciences’ Mark Taylor, who led the team.

“The lead isotopes showed that background honey bees and their products contained natural lead levels, whereas those from Sydney and Broken Hill were clearly contaminated by legacy petrol sources and ongoing mining emissions, respectively.”

[Find out more.](#)

Photo by [Fotoworkshop4You](#).

Monitoring whale health by using drones to collect their blow



Biological Sciences researchers have led the design and construction of a new system to sample whale microbiota—the combination of natural bacterial colonies that live in an organism—by flying over and collecting exhaled vapours from their blowholes.

The system can be fitted to a custom-built, waterproof drone to monitor the health of whales in a non-invasive manner.

“In conjunction with drone experts, we have developed a low-cost system which incorporates a sterile petri dish with a remotely operated and novel ‘flip lid’,” says lead researcher Vanessa Pirotta.

“This can be attached to a drone along with a GoPro camera to sample whale blow with minimal disturbance to the whales.

“This system allows us to collect samples safely and reliably, by minimising external contamination such as air and seawater from outside the blowhole.”

[Find out more.](#)

Hot weather is bad news for bird sperm and size



A new study led by Biological Sciences' Laura L Hurley has shown that exposure to extreme temperatures, such as those experienced during heatwave conditions, significantly reduces sperm quality in zebra finches.

These findings, published in *Proceedings of the Royal Society B*, suggest that rising global temperatures and increases in the frequency of extreme heat events could be a concern for male fertility and reproductive success in some birds.

[Find out more.](#)

Another study by Biology's Samuel Andrew and colleagues, and published in *The Auk: Ornithological Advances*, has found that warming temperatures may cause birds to shrink.

By measuring adult European House Sparrows at 30 locations across Australia and New Zealand, they found that maximum temperatures during summer—when the birds breed—were a better predictor of adult body size at each location than winter minimum temperatures.

[Find out more.](#)

Photo by Laura Hurley.

Macquarie mathematician's talk is 'Cherry Ripe'



Mathematics' Chris Lustri has won the highly-esteemed Cherry Ripe Prize at the annual Australia and New Zealand Industrial and Applied Mathematics (ANZIAM) gathering earlier this month.

One of the enduring traditions of the meeting is the award of a best talk (being a mathematics conference, there are no papers) presented by a student. This award, the Cherry Prize, was first made in 1969.

In 1995, in a clear effort to improve the quality of the talks by academics, the student delegates at the meeting awarded the first ever Cherry Ripe Prize.

Some say that it was originally aimed at the worst talk presented by an academic researcher, hence the 'Ripe' in the award's title, but the truth of this assertion is lost to history. It is now hotly contested as the best staff talk prize and brings much esteem to the winner.

Chris was presented with a certificate and the award (a real Cherry Ripe) at the conference banquet for his talk about the dynamics of particle chains, such as beads or molecules, and how energy pulses moving through these chains decay due to very small, high-frequency vibrations induced in particles near irregularities or defects in the chain.

Chris says the prize holds special meaning because it was decided by the harshest judges of all—graduate students!

“It is often challenging to convey highly technical mathematical ideas in a way that is informative, and captures the imagination of the audience,” he says.

“I am encouraged that the students found my work interesting and valuable, and hope that it stirs new interest in these ideas within the Australian research community.”

Domestic travel key to distribution of flu



All major Australian cities appear to experience outbreaks of flu around the same time each year, according to new research from the Department of Biological Sciences' Jemma Geoghegan.

Published in *PLOS Pathogens* last month, the research has also shown that commuting to work is less important than long-distance domestic travel when looking at the overall spread of flu throughout Australia.

The researchers used influenza surveillance data collected between 2007-2016 from more than 2,500 postcodes to map the spread of the flu virus across Australia.

“We have shown that influenza enters Australia multiple times from the global population—this highlights the highly globalised world in which we live,” says Jemma.

“It spreads almost instantaneously throughout Australia—likely driven by both highly domestically connected cities [Sydney and Melbourne]. During the 2009 swine flu pandemic for example, we found that all postcodes experienced outbreaks at the same time.”

[Find out more.](#)

Photo by [William Brawley](#).

How PACE helped me find work after uni



Pia O'Donnell is an excellent example of the impact Macquarie's Professional and Community Engagement (PACE) program can have on our students' future careers.

The former student, who graduated with a Bachelor of Science majoring in Climate Science and Spatial Information Science, undertook an internship at Weatherzone as part of a PACE unit.

While she was there she worked on weather chart production, quality control of weather icons and warnings, and assisted with weather forecasting.

“The experience at Weatherzone was eye-opening and challenging because I had to remember all the meteorological information I had learnt over the previous years, and apply them in a practical environment,” says Pia.

“The PACE course allowed me to have first-hand experience in an office environment; the confidence I gained from Weatherzone helped me to go out into my chosen field and successfully gain employment much more quickly than I anticipated.”

Pia is now a Geographic Information System Analyst at the NSW Department of Planning and Environment.

Weatherzone's Max Gonzalez says they hope their partnership with Macquarie through PACE helps foster a culture of research and innovation with the public and private sectors.

"We are proud to be part of a program which provides undergraduates with the opportunity to increase their understanding of the industry sector, further develop their skills and extend their professional network."

There are 21 PACE units in the Faculty, with at least one in each Department. All Bachelor students take at least one PACE unit as part of their degree program.

In 2017, 841 students enrolled in our PACE units, and we engaged with just over 190 industry and community partners through the program.

Photo courtesy of Pia O'Donnell.

Symmetry in higher dimensions inspires new journal



Macquarie University is the publisher of a new mathematics journal called *Higher Structures*.

The journal is devoted to higher-dimensional notions of symmetry as they arise in various fields, including geometry, physics, logic, and computer science.

In time, such research could lead to advances in quantum computing and string theory.

Michael Batanin, from Mathematics, is one of the three Chief Editors, and several other members of the Centre of Australian Category Theory (CoACT) are on the Editorial Board, recognising the leading role Macquarie researchers are playing in this subject.

The dream of launching such a journal dates back to 2014, and a big step towards fulfilling it was made during a three-month program at the Max Planck Institute in Bonn dedicated to this subject, and organised by the Chief Editors.

The journal is being published electronically, and uses a new online platform developed by the Information Technology unit at Macquarie together with former student and research fellow at CoACT Mark Weber.

[See the first issue.](#)

Engineering educators energised by conference



Macquarie University has hosted the Australasian Association for Engineering Education (AAEE) conference for the first time in the association's history.

The AAEE 2017 conference was held in December last year, around the theme of 'Integrated Engineering'.

Regarded as the biggest annual gathering of engineering educators in the Australasia region, the conference was organised by the School of Engineering with sponsorship from the Faculty, and the Office of the NSW Chief Scientist and Engineer.

More than 260 delegates attended and 143 papers were presented. Macquarie Vice-Chancellor Professor S Bruce Dowton opened the conference, followed by a wonderful keynote speech by Lindie Clark, Academic and Programs Director of PACE.

Congratulations to all involved for such a successful event.

[Find out more.](#)

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 a few of the updates we've shared recently.

Did you know this Sunday #February11 is @WomenScienceDay? @EnvScMQ's @ShariGallop spoke to @ABCCentralCoast about the day this morning.
#WomenInScience

"The fact that our threatened species lists continue to grow and very few if any species have ever come off those lists due to conservation action is evidence that what is being done thus far is not effective," says @MQBiology's Lesley Hughes. QT @GuardianAus: 'A national disgrace': Australia's extinction crisis is unfolding in plain sight
#OurWideBrownLand [Read the article](#)

RT @NISEP01: Even teachers can learn. Traditional weaving lessons at the 2018 Macquarie Science Experience. #niseop #mqse #mqmolsci @MQSciEng MolSci@MQ National Indigenous Science Education Program @ScienceExp The Science Experience Walanga Muru - Macquarie University #walangamuru

RT @Macquarie_Uni: Dr Emilie Ens from the Department of Environmental Sciences explains how 'Indigenous ranger programs are working in Queensland – they should be expanded' [Read her article](#)

Six Aussies prove the spirit of innovation is thriving & @MacUniMaths's @sophluidynamics is one of them! [Read the article](#)

Horsehair worms can still escape from the guts of their host's predators, says @MQBiology's @FleurPonton QT @TheAtlantic: "An explosion was audible inside each toad." @edyong209 offers a brief guide to survive being swallowed by a predator. Pro tip: It helps if you can create scalding chemical explosions from your butt. [Read the article](#)

What affects the health of groundwater-dependent ecosystems? @MQBiology's Kathryn Korbel spoke to @NSWCounryHour yesterday about what her research reveals about aquifers in Namoi and Gwydir valleys. Interview starts at ~39:18 [Listen to the audio](#)

@ReneHJHeim won for his poster 'Multiscale Remote Sensing of Plant Pathogens: Detecting Myrtle Rust in Australia' Congratulations Rene! QT @BritishEcolSoc: A huge congratulations to our Overall Student Poster Prize Winner @ReneHJHeim from @MQBiology @Macquarie_Uni #EAB2017 [Find out more](#)

Kadovar #volcano erupts: @MqEPS's Dr Chris Firth says: - this is 1st well-documented eruption from the volcano - there's possibility it may trigger landslides - given lack of monitoring infrastructure it's hard to predict what will happen [Read his comments in full](#)

RT @EnvScMQ: We're kicking off 2018 with a bang! Out of ~6000 publications, the "Impacts of Climate Change on Allergens and Allergic Diseases" by Paul Beggs was chosen as one of the Outstanding Academic Titles in 2017 by @Choice_Reviews magazine! Amazing work! [Find out more](#)

Faculty bulletin

New staff | Current vacancies | Infrastructure grants | Academic promotions | FIRST volunteers | PURE profiles | 500 Women

Welcome to new Faculty staff

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

Please join me in welcoming **Paul Bryan** who is a new DECRA Fellow in Mathematics. Paul joins us from the University of Queensland.

Fatemeh Salehi has joined us from the University of Sydney as a lecturer in Mechanical Engineering.

Simon Clulow has joined Biology as a research fellow from the University of Newcastle. Simon's interests include frogs, gene banking and [Beyoncé](#).

Michael Stat and **Bruno Buzatto** have moved east from Curtin University and the University of Western Australia respectively, to join Biology as lecturers.

Eva Lu joins the Faculty as a new Higher Degree Research Officer from the Australian Catholic University.

Shihao Yan has joined us from the Australian National University as a new research fellow in the School of Engineering.

Toney Teddy-Fernandez is a new lecturer with Physics and Astronomy. He joins us from the Polytechnic University of Milan.

And **Rachelle Carritt** has joined us as a Project Officer for Faculty Outreach. She joins Macquarie from the University of New South Wales.

Current vacancies

We're looking for a [technical support officer](#) to support the School of Engineering's Electrical Engineering teaching and research laboratories.

A [stable isotope geochemist](#) to manage Earth and Planetary Sciences' management of the MAT 253+ and isotope clumping laboratory.

A [research librarian](#) to provide high-quality research, teaching and learning support services to researchers, academics and students in the Faculty.

A [post-doctoral fellow in geophysics](#) to participate in a multi-observable probabilistic tomography research project.

A [senior scientific officer](#) with experience in terrestrial fieldwork to join the Department of Biological Sciences.

And a [post-doctoral research fellow](#) to support a research project using observations obtained as part of the VISTA Survey of the Magellanic Clouds (VMC).

Macquarie Research Infrastructure Scheme (Large) grants

Congratulations to all those who received funding through the MQ Research Infrastructure Scheme (Large) grants. In total, the Faculty received over \$650,000 for six different items.

Physics and Astronomy were funded for a UV-vis-infrared double-beam spectrophotometer (**Rich Mildren**) and a next-generation small-animal optical imaging platform (**Yiqing Lu**).

Molecular Sciences (**Ian Paulsen**) received funding for a high-throughput phenotype analysis system.

Earth and Planetary Sciences (**Martin Kennedy**) have been funded to purchase an IBEX clumped isotope sample preparation system.

And Biology received funding for a pipetting robot (**Fleur Ponton**) and a high-resolution macro and micro digital imaging system (**Matthew Bulbert**).

Academic promotion information sessions

Academic promotion information sessions will be held in mid-February, with exact dates still to be advised. Applicants will then be required to submit their application for review by their Head of Department by 2 April.

Call-out for *FIRST* volunteers

FIRST Robotics is an internationally-acclaimed robotics program that aims to inspire a passion for science, technology, engineering and maths in young people. *FIRST* Australia was established at Macquarie University in 2006, and this year's two regional competitions will take place at Sydney Olympic Park over six days in March.

FIRST is looking for volunteers to assist at the events, and I would encourage any interested staff members to take part. You can volunteer on individual days or for a whole three-day event. [More information is on their website.](#)

Updating your PURE profile

Any staff wanting to update their PURE profile, or learn more about the PURE Research Management System, are invited to attend an introduction to PURE training session on 28 February. [More details.](#)

500 Women

[500 Women](#) is an excellent new resource building a database of women scientists and seeking to match their expertise with media, policymakers, educators and other researchers around the globe.

I would encourage the many brilliant women in science who work in our Faculty and anyone interested in gender equity in science to check it out.

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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