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MACQUARIE University

FACULTY OF SCIENCE AND ENGINEERING

March 2018

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# From the Dean

NEWSLETTER | MARCH ISSUE

## Dear Suzannah

I recently had the opportunity to talk to an audience of designers, engineers and roboticists. No, I wasn't attending an international conference, I was speaking to high school students from across the Asia Pacific who had come to Sydney to take part in the *FIRST* Robotics Competition Australian Regionals.

I've very proud of the work our *FIRST* Australia team, led by Luan Heimlich, does in running these events. Not only because they fit with our belief as a science and engineering faculty that science, technology, engineering and mathematics will enable us to tackle the global challenges of our time. But also because they're giving young people the opportunity to explore the places a career in STEM could take them. By taking part in *FIRST*, I hope it's a path they choose to pursue.

I'd also like to take this opportunity to thank all the members of the Faculty who took part in the recent Gender Equity Week events. It was great to see FSE so strongly represented. I learnt about pioneering but forgotten women in science through Lesley Hughes and Michael Gillings' exhibition. I got to hear Jemma Geoghegan and Kira Westaway speak about their fascinating research and personal journeys in science at the Macquarie Women Changing the World Symposium. I'm proud of the work Heather Handley is doing as the co-founder of WOMEESA, a new network for women in earth and environmental sciences. And I was pleased to see recognition of the great work our Department of Physics and Astronomy is doing in tackling gender bias.

As a member of the university executive I was asked to share the personal commitment I'm making towards gender equity in 2018. My commitment this year is to continue to bring more women into STEM and using our scholarships program, which we will be building over the next year.

There's plenty more news in this month's newsletter, including: how our Cyber Security Hub is working on new ways of sharing data without compromising privacy; the first study of Australian akoya pearls; and how eggs came to be shaped like, well, eggs.

Also read on to be introduced to our latest 11 recruits and for details on our four current vacancies.

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 me at fse.execdean@mq.edu.au and we'll share the news.

Regards,

Barbara

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## In this bulletin


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### *FIRST* Robotics Competition powers up students' learning

The *FIRST* Robotics Competition Australian Regionals, held earlier this month, were again a big success.

Sydney Olympic Park was taken over by 51 Australian and 22 international high school teams from across the Asia Pacific for the two events, which also saw a visit from the Minister for Jobs and Innovation Michaelia Cash (pictured above).

I'm very proud of *FIRST* Australia director Luan Heimlich and her team, and everything they've achieved with the program, not only with the competition itself but also the other activities that have sprung up around it including the *FIRST* Ladies networking breakfasts, the careers fair and high school students' workshops.

As I said to the attendees at the breakfasts, we believe that science, technology, engineering and mathematics will enable us to tackle the global challenges of our time, and we hope that by taking part in *FIRST* it's a career path they will choose to pursue.

*FIRST* Australia is an initiative of the *FIRST* Foundation and Macquarie University, and is presented with the generous support of Google Australia, Ford Australia and our other partners.

Find out more

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## Sharing data without compromising privacy


Cybersecurity was in the news last month when the Federal Government's Notifiable Data Breaches scheme came into force, which requires companies to let you know when personal data they hold on you has been lost.

Australian Privacy Commissioner Timothy Pilgrim spoke about the legislation at an Optus Business event on the day it came into effect.

Christophe Doche and Dali Kaafar from the Optus Macquarie University Cyber Security Hub also spoke at the event about the work the Hub is doing in this important field.

“Fifty-nine per cent of Australians have decided not to deal with a company due to some privacy concerns,” says Dali. “That shows that Australians do care about their privacy and it shows that Australians do value their data.”

The Hub is tackling cybersecurity from many different angles, explains Christophe, bringing together people from different disciplines and backgrounds, including academia, business and government.

One of the key research projects they’re working on, in partnership with CSIRO’s Data61, is about allowing organisations to share data in a way that is useful, but without compromising the privacy of individuals.

Working with the Department of Social Services and Data61 they’ve developed a tool that allows people to calculate the probability of de-identified or anonymised data they are looking at sharing, being re-identified.

But Dali says we also need to consider a different approach when we’re dealing with data.

“We need to stop using the original data,” he says, “and engineer a different way to actually use the data and extract analytics out of it while maintaining privacy.”

“For years, we’ve been building higher walls, and cyber criminals have been building higher ladders to jump over these walls and get access to our data. It’s an arms race that is destined to fail.”

“Let's move to a complete different paradigm, away from this notion of data as a honeypot, and just use something that cyber criminals have no interest in, in the first place.

“We are building provably private synthetic data generation algorithms that preserve the statistical value and characteristics of the data, without revealing any sensitive information about individuals.”

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## Welcome to our new Associate Dean (Global Engagement)

We were very excited to welcome Richard de Grijs as our first Associate Dean (Global Engagement) earlier this month.

Richard is an outstanding astronomer, and joins us from the Kavli Institute for Astronomy and Astrophysics at Peking University where he recently served as Associate Director of the Institute.

Richard is aiming to increase Macquarie's international visibility. He will be working with Tracy Rushmer on how to inform potential research partners about our strengths and opportunities for collaboration.

Richard, we are looking forward to working with you.

Find out more

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## Why are eggs shaped the way they are?

The shape of a bird's egg is determined by the climate in which they typically breed, and the extent to which their nest protects the egg from the sun, according to new research from the Department of Biological Sciences.

The study, published in *Scientific Reports*, examined egg shape in over 300 species of Australian birds that live in some of the most extreme climates on earth, from the wet and humid tropics, to the dry and hot inland deserts.

Lead author Daisy Duursma says as Easter approaches and the shops are full of chocolate eggs, it is a good time to be wondering why bird eggs are egg-shaped and not nice round balls.

"There is a tension between allowing oxygen to get inside the egg, so the embryo can breathe, but at the same time not allow too much moisture to escape and risk dehydration," she says.

Find out more

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## What a pearler: first study of unique Australian akoya pearls

The first gemmological and mineralogical study of Australian akoya cultured pearls has been published in leading international journal, *Gems & Gemology*.

These akoya cultured pearls—from Broken Bay in Woy Woy, New South Wales—are special because they occur in a wide variety of natural colours that range from classic white and silver to more unconventional colours like yellow, orange, pink and blue.

The research aimed to understand how these pearls differ from other pearls. In the future, such findings could help gem-testing labs for example, determine the origin and authenticity of particular pearls.

“It is a unique opportunity for us to be able to observe this richness in colour range,” says lead author and PhD student with the Department of Earth and Planetary Sciences, Laura Otter. “The pearls from Broken Bay are marketed without the use of any bleaches or dyes as is common practice elsewhere.”

Since the study has been published, the pearl farm who collaborated with the researchers has seen an increase in enquiries about their pearls.

Read the study

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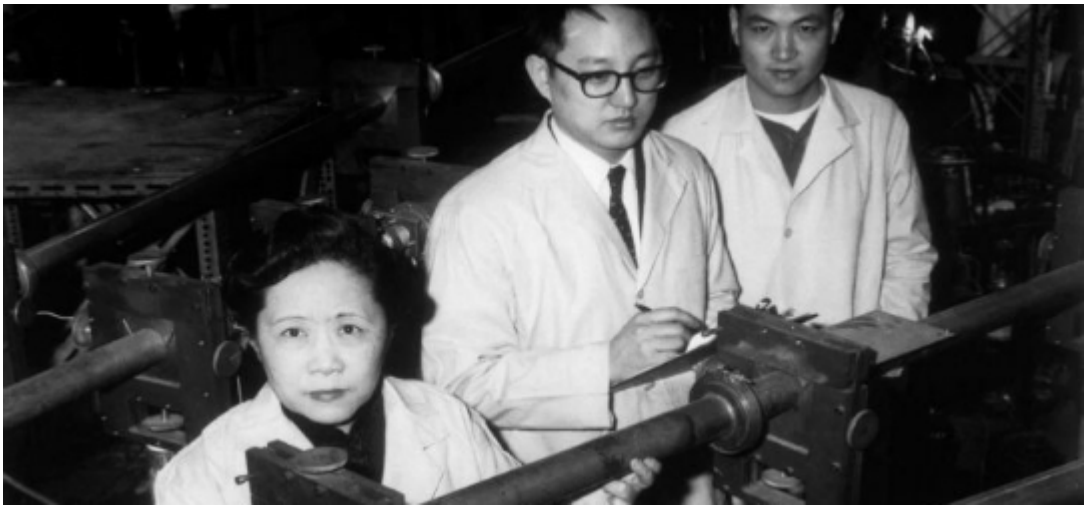
## Spotlight on gender equity



Macquarie's first ever Gender Equity Week took place earlier this month, and our Faculty was heavily involved.

Congratulations to Biology's Lesley Hughes, Michael Gillings and everyone else who was part of the team behind the Hidden Figures of STEMM exhibition, which profiled pioneering but forgotten women of science through history.

Women like well-known children's author Beatrix Potter, who was also studied and drew fungi and lichens. Chien-Shiung Wu (pictured above) who was a pioneer in experimental nuclear physics. And Eunice Foote who discovered the greenhouse effect, by recognizing the link between carbon dioxide concentration and global warming.

For Lesley, the reason why we should strive for greater gender equity is obvious: "Ultimately, it's just about fairness in society. Women hold up half the sky so why shouldn't they have equal opportunities in everything?"

Biology's Jemma Geoghegan and Environmental Sciences' Kira Westaway shared their personal journeys and fascinating research at the Macquarie Women Changing the World Symposium.

And I was pleased to see recognition of the great work our Department of Physics and Astronomy has been doing in this area.

Simple things like removing gendered information from their job applications and improving the gender balance of their invited speakers are already shifting the department's culture.

As Jo Dawson and Daniel Zucker explained: "Conversations about diversity and equity are now the norm, and many staff are regularly viewing their actions through that lens. We think that our people—including our students—are more comfortable raising issues than they were before."

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## Uniting women in earth and environmental sciences


While her research is improving our understanding of volcanic hazards in the Pacific 'Ring of Fire', the Department of Earth and Planetary Sciences' Heather Handley is also looking at how to better support all women working in earth and environmental sciences in Australasia.

She's the co-founder and president of Women in Earth and Environmental Sciences Australasia (WOMEESA).

The new network aims to unify women across these fields, whether they're working in academia, government or industry.

It was launched on International Women's Day with events at Macquarie University (including an incredible WOMEESA cake) and the University of Queensland, and already has 158 members.

"Women are often underrepresented in earth and environmental sciences," says Heather, "so there is a need to support women working in these fields by building a supportive community. We hope this will also facilitate greater collaboration."

"In particular, we want to support women at critical stages of their career that often leave employment, such as early career researchers and those with carer responsibilities."

Visit WOMEESA's website

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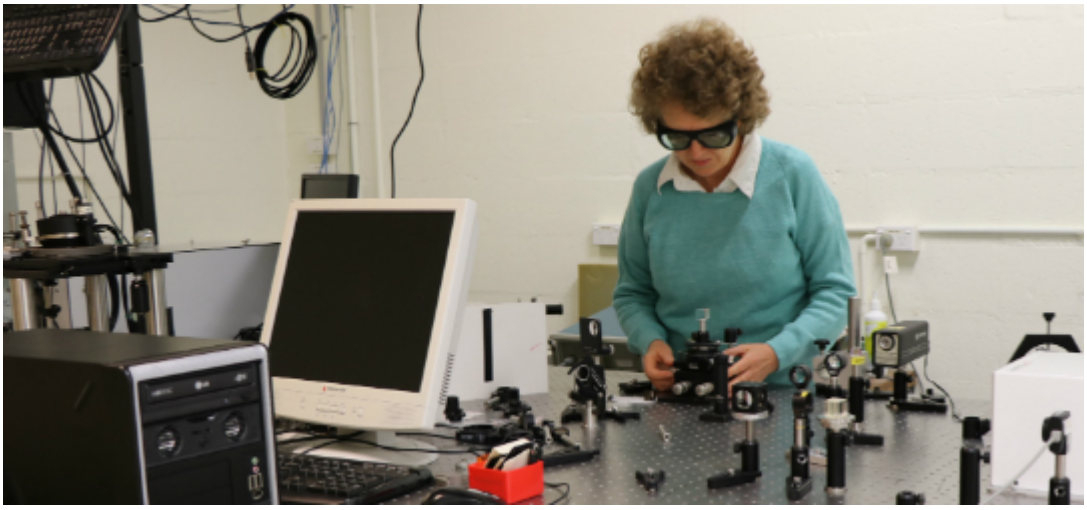
## Laser and optics researcher Judith Dawes named SPIE Fellow



Congratulations to the Department of Physics and Astronomy's Judith Dawes who has been elected a fellow of SPIE, the international society for optics and photonics.

Judith was recognised for her achievements in laser development and laser applications in medicine.

"I am delighted to be recognized as an SPIE Fellow in the same year as my former Macquarie colleague Ewa Goldys," says Judith.

"I appreciate very much the acknowledgment of my research with my students and collaborators over many years, and of the work I have done for optics in Australia."

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## Cyber Six rise to Codeathon Challenge


Macquarie students have triumphed at the inaugural ASEAN-Australia Codeathon.

The 32-hour event, held earlier this month as part of the lead-up to the ASEAN-Australia Special Summit, brought together more than 100 participants from 10 nations

to find new solutions to combat terrorism financing, money laundering, and cyber threats.

FSE's James Ridey, who is studying for a Bachelor of Engineering (Software), teamed up with the Faculty of Arts' Security Studies students Cameron Rose, Jacinda Erkelens, Georgia Turnham, University of Sydney student Andrea Gonzales and cybersecurity professional Dean to form team Cyber Six.

They came first in their selected category 'Applying blockchain technologies to improve financial services, AML (Anti Money Laundering) compliance or secure intelligence sharing' with their project CryptoCollect.

It uses artificial intelligence to identify suspicious activity and individuals when acquiring cryptocurrencies, and has the potential to improve the capabilities of financial regulators to combat terrorism financing.

The team were also awarded the Codeathon Challenge Runner-Up for placing second overall in the competition. Well done!

Watch a presentation of Cyber Six's project CryptoCollect

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### Excellence in botanical literature

Congratulations to David Mabberley for being awarded the prestigious American Botanical Council's James A. Duke Excellence in Botanical Literature Award.

David, who is an Adjunct Professor with the Department of Biological Sciences, received the award for his book *Joseph Banks' Florilegium: Botanical Treasures from Cook's First Voyage* which he co-authored with Mel Gooding and Joseph Studholme.

In presenting the award the council acknowledged the tremendous historical value offered by Banks' collection and documentation of plants from around the world.

"This artistic and informative text is a milestone in botanical publishing and a worthy addition to any botanical library," they said.

David has specialised in producing books that incorporate botany, history and art and we are extremely fortunate to have him as an Adjunct Professor.

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## 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 @BarbaraMesserle and @MQSciEng.**

How dangerous is dust? @EnvScMQ's @mptaylor66 spoke to @talklifestyleau about what he's finding in our household dust & what we can do to best protect our health. Listen to the interview

@SimonClulow's favourite Aussie frogs are Notaden burrowing frogs, whose colourful dots & patterns make them look like spectacular Aboriginal paintings. “With their rather rotund body form, they often remind me of characters out of Mario Kart.” #WorldFrogDay

"I was inspired to pursue a career in physics." "His wisdom on life made a profound impact on me." “His story... shows that what really counts is the ‘inside’." @MQPhysAstro researchers share how Stephen Hawking impacted their lives personally. Read the article

The question I hear most often in my work is… "How did you use a drone to collect whale snot?" @MQBiology's @VanessaPirotta talks about what drew her to biology. Read the article

Last night Deputy Dean Bernard Mans & I attended the launch of @eurekaprizes at @austmus. @kimcoral interviewed a panel of last year's prize winners, including our own @EmilieEns The theme for the evening was 'Science for humanity'.

Curious Kids: Why aren't birds pulled down by gravity while they're flying? @MQBiology's Simon Griffith explains. Read the article

As a member of the university executive this is the personal commitment I'm making towards #genderequity in 2018 My commitment this year is to continue bringing more women into STEM & using our scholarships program which we will build over the next year Watch the video

RT @insituscience: This week we have #behaviourecologist @MBulbert from @Macquarie_Uni on the podcast! we have a chat about his journey to foreign countries in search of poorly understood #animals, and #describing and #studying behaviours that haven't been studied before! Listen to the podcast

RT @Macquarie_Uni: Introducing the Sydney Quantum Academy! Macquarie is teaming up with @Sydney_Uni @UNSW and @UTSEngage to build a powerful quantum computer with the help of $500,000 in funding from the NSW Government. Learn more #QuantumComputing

Toba eruption shards have a very distinct geochemical fingerprint, says @EnvScMQ's @lumilicious. "If you can find it in your sediment, you have what's called a 'marker horizon' where you know it's 74,000 years." QT @lumilicious: Great new paper in Nature by Curtis Marean and Zenobia Jacobs on modern humans surviving Toba via coastal living- happy to provide some comments @MQSciEng @EnvScMQ Read the article

RT @MacUniMaths: #Maths helping to fight cancer! Our own Dr Catherine Pennington (who uses Maths to understand early cancer growth) says, "that is why #mathematical #models can be powerful, they are a way to sort through possible mechanisms & make predictions that can be tested by experiments." QT @conversationEDU: Collaborations between mathematicians, #cancer biologists + clinical oncologists enable both rapid cost-effective testing of cancer drug combinations, + deeper understanding of cancer drug resistance. #teamACRF #LetsOutsmartCancer Read the article

Business leaders in health & consumer discretionary sectors are feeling less positive about the year ahead because consumers are feeling the pain in the hip pocket, according to analysis co-authored by @computing_mq's Leonardo dos Santos Pinheiro QT @jenni_henderson: Face Value: business leaders nervous about consumers spending less and regulation #ausbiz #ausecon Read the article

"I like Australian ants. They're crazy," says @MQBiology's @ravindra_pn QT @ravindra_pn: I was featured in this well-written story in @smh as 'an ant nut'. Take a look @MQBiology @MQSciEng

How to breed 'Olympic' sterile fruit flys: "We're giving them all sorts of supplements… even caffeine, which accelerates their development & gets them into the mating at a younger age," says @fruitflyittc's Prof Phil Taylor QT @KerryStaight: Latest weapon in the fight against Queensland fruit flies unleashed Read the article

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# Faculty bulletin

## New staff | Current vacancies | University bioQuest |360 Dust Analysis | MyScience@MQ | Astronomy Open Night

### 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 **Shin Yoong Lim** and **Sarah Henry** who have joined Molecular Sciences as administration assistants from Sydney North Neurology & Neurophysiology and SM Safety respectively.

**Ming Li** is a new lecturer in Mechanical Engineering and joins Macquarie from the University of California.

**Yipeng Zhou** has joined us from the University of South Australia as a lecturer in Computer Science.

**Richard de Grijs** is the Faculty's new Associate Dean (Global Engagement) and joins us from Peking University.

**Meredith Lowe** is the Faculty's new Operations Manager and joins us from the University of New South Wales.

**Mihai Ciobotaru** is a senior lecturer in Electrical Engineering, also joining us from UNSW.

**David Coleman** joins Biology as a research officer. He was previously at the University of Sydney.

**Rouzbeh Abbassi** has moved north from the University of Tasmania to join Engineering as a senior lecturer in Environmental Engineering.

**Roy Walker** is a new research fellow with Molecular Sciences. He was previously at the University of Edinburgh.

And **Ilya Fomin** is a post-doctoral fellow in geophysics, joining us from ETH Zurich University.

## Current vacancies

We're looking for an outstanding academic leader to take up the role of Head of Department for our newly merged Department of Mathematics and Statistics.

We have an exciting opportunity for a senior lecturer with experience in applying high-pressure, high-temperature experimental approaches to understanding the structure and dynamics of Earth and other planetary bodies to join the Department of Earth and Planetary Sciences.

Biological Sciences is seeking a talented, highly motivated and field-experienced postdoctoral research fellow in Data Analysis and Modelling (plant functional ecology) and a postdoctoral research fellow in Plant Functional Ecology (field ecophysiologist).

## Take part in the University bioQuest

We are taking part in the University bioQuest challenge and we want your help! This is an international competition with other universities to find out which campus has the most diverse range of plants and animals.

"The data collected through this competition contributes to the Atlas of Living Australia, which holds location data for Australian species, is vital to research, and creates a fuller picture of species distribution across Australia," says Samantha Newton, FSE's Arboretum Coordinator.

Macquarie University has extensive biodiversity assets, with the Macquarie University Arboretum, including the wetland, Sydney Turpentine Ironbark Forest, the Ecology Reserve, and our excellent teaching gardens. And we're right next to Lane Cove National Park.

The program runs for the whole month of April. Join the Macquarie University team now.

### 360 Dust Analysis want your dust

360 Dust Analysis need more samples to analyse for their citizen science project looking at what contaminants, DNA markers and plastics are present in household dust, and they would love for Faculty staff to contribute. All you have to do is fill in a two-minute survey on their website and then collect and send in your sample.

You can post it in, put it in internal mail, or drop it off in the DustSafe box which is in the post room at Level 4, 12 Wally's Walk.

### Become a MyScience@MQ mentor

If you have expertise in an area of science or engineering, or have a desire to learn about such things, then you may be eligible to become a MyScience@MQ mentor.

Your role will be to support primary students in their quest to plan, conduct, analyse data and report findings of their own scientific investigation. You can play an important part in nurturing the next generation of science and engineering superstars.

The program is being run through the Faculty of Human Sciences but I would encourage any interested FSE staff to apply.

### Save the Date: Astronomy Open Night

Mark it in your calendar, this year's Astronomy Open Night will be on Saturday 19 May. More details to follow.

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## 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
- Barbara on Twitter: @BarbaraMesserle

**Got a story?**

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