AustMS
Early-Career Workshop

West Beach, Adelaide, 2nd–3rd December 2018

ORGANISERS: LUKE BENNETTS AND MICHAEL COONS

`www.maths.adelaide.edu.au/luke.bennetts/AustMSECW2018.html`

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Contents

1 Welcome

Welcome to the AustMS Early-Career Workshop 2018! We hope you will find the mix of talks inspiring and informative, and that you will enjoy interacting with your fellow ECRs.

We thank our sponsors, AMSI and AustMS, and Michelle Phillips from Functions@SeaRescue and Madelaine Veltman from Uni Adelaide for their great help in organising this event.

Luke Bennetts and Michael Coons
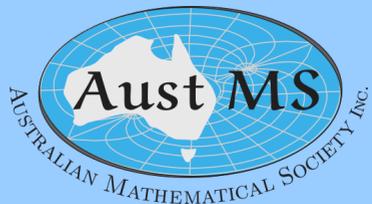
2 Workshop & Accommodation Details

The Workshop will be held at Functions@SeaRescue, West Beach, Adelaide (formerly Barcoo Function Centre), including the dinner.

Map data ©2018 Google   200 m
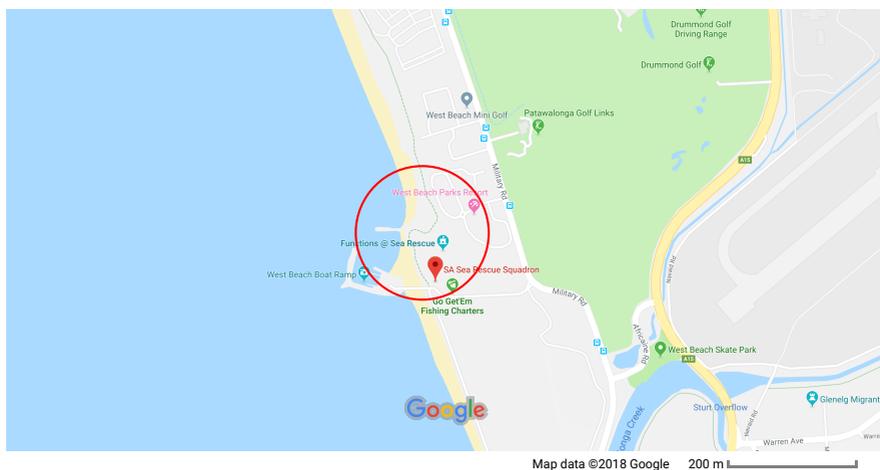
WiFi details will be provided on arrival.

Accommodation on the Sunday evening is at the nearby West Beach Parks Resort (for those that indicated they required accommodation on the registration form). Check-in is at 2pm on Sunday, but you are able to leave your luggage at reception prior to this. Check-out is at 10am on Monday.

Snacks will be available prior to the start of the workshop on Monday. The units are equipped with kitchens if you would like to bring your own food. There are also restaurants 10–15 mins walk (1–1.5 kms) away.

3 Programme

Sunday	
13:00–13:30	Arrival and Welcome
13:30–14:00	Corey Bradshaw *Advice*
14:00–14:30	Adrian Dudek *Industry*
14:30–15:00	Afternoon Tea
15:00–15:30	Hinke Osinga *Advice*
15:30–16:00	Lewis Mitchell *Research*
16:00–16:30	Q+A Session
16:30–17:00	Free Time
18:00–21:00	Dinner
Monday	
08:45–09:00	Tea/Coffee and Snacks
09:00–09:30	Cecilia González Tokman *Research*
09:30–10:00	Jan De Gier *Advice*
10:00–10:30	Morning Tea
10:30–11:00	Renato Bettiol *Research*
11:00–11:30	Q+A Session
11:30–12:00	Lunchtime snacks

4   Speakers

Corey Bradshaw

Flinders University

Advice Speaker

Corey is the Matthew Flinders Fellow in Global Ecology at Flinders University where he heads the Modelling Node of the Centre of Excellence for Australian Biodiversity and Heritage. Previously, he was the Sir Hubert Wilkins Chair of Climate Change at the University of Adelaide and an ARC Future Fellow, with former positions at the South Australian Research and Development Institute, Charles Darwin University, and the University of Tasmania. Corey has completed three tertiary degrees in ecology (BSc, MSc, PhD) from universities in Canada and New Zealand, and a Certificate in Veterinary Conservation Medicine from Murdoch University.

His raison d'être is to demonstrate to human society that we can no longer ignore the impacts of deforestation, pollution, disease, habitat loss, extinctions, over-grazing, over-fishing or warming climates on human wealth, health and wellbeing. Scientists must not only present the empirical evidence underlying these relationships, they should also excel in telling their stories and advocating for positive change. In a world where human activity has precipitated the current Anthropocene extinction event, his aim is to provide irrefutable evidence to influence government policy and private behaviour for the preservation of our planet's biowealth.

Corey has published over 270 peer-reviewed scientific articles, 11 book chapters and 3 books. He is highly cited, with nearly 17000 citations to date, an h-index of 64, and a m-index 3.4. He is a member of the

Faculty of 1000 and Fellow of the Royal Society of South Australia. He was awarded the 2017 Verco Medal from the Royal Society of South Australia, a 2017 Rockefeller Foundation Bellagio Writer's Fellowship, the 2012 Mid-Career Research Excellence Award from the Faculty of Sciences at The University of Adelaide, the 2010 Australian Ecology Research Award, the 2010 Scopus Young Researcher of the Year, the 2009 HG Andrewartha Medal, and a 2008 Young Tall Poppy Science Award. He is regularly featured in Australian and international media for his research. His blog, ConservationBytes.com, has been visited over 2 million times.

The Effective Scientist: Steps to follow for a successful academic career: Covering everything from writing efficiently, organising your time and money, supervising, managing stress, presenting yourself and your research, as well as dealing with the frightening world of social and traditional media, I will describe in this seminar how fledgling scientists can avoid many of the mistakes that their seasoned mentors make on the path to scientific greatness.

Adrian Dudek

Optiver

Industry Speaker

Adrian grew up in Perth but at some point decided that prime numbers were interesting little things and so moved to Canberra to learn more about them. He finished his PhD at the ANU in 2016 writing on 'Explicit Estimates in the Theory of Prime Numbers'. These days he trades options (funky little financial contracts) at Optiver in Sydney whilst finding time to continue his research in number theory on the train ride into work each day. He spends his weekends relaxing on the beaches of Cronulla with his wife and daughter. He recently started the blog mathsymuddles.com to share interesting problems and puzzles.

The Working Mathematician: Let A denote the set of happy people, B the set of people working in industry and C the set of people doing maths that they enjoy on a daily basis. The purpose of this talk is to prove that the intersection of A, B and C is non-empty. To prove this, the speaker demonstrates himself to be an element belonging to all three sets. He then describes and proves the often unmentioned result that each member of the audience can be continuously mapped to an element in the intersection of these three sets (if they wish).

Hinke Osinga

University of Auckland

Advice Speaker

Hinke is Professor in Applied Mathematics at the University of Auckland, New Zealand. She is a Fellow of the Royal Society of NZ, NZ Mathematical Society and Society for Industrial and Applied Mathematics. She obtained her PhD from the University of Groningen, and held positions at The Geometry Center in Minneapolis, the California Institute of Technology, and the University of Exeter. She then held a tenured position at the University of Bristol for more than ten years, before taking up the professorship in Auckland in 2011. She is a specialist in dynamical systems theory and the development and application of numerical methods for computing invariant manifolds. Her work constitutes a significant contribution to manifold theory, for which she was awarded the Research Award of the NZ Mathematical Society. Her publications, illustrations, animations and outreach activities have made her famous worldwide in the mathematics and arts communities. Her international standing was recognised by her invitation to speak at the 2014 International Congress of Mathematicians.

Career development: Is it real?: The complexities of finding a postdoc position and, later, a permanent position in academia can be quite daunting for a finishing PhD student. Indeed, finding the perfect job is something that needs awareness and active planning already during the PhD. In this talk, we will highlight some of the important aspects in this task and explain how to make the most of the PhD time to develop a CV that will come out top for many university positions.

Lewis Mitchell

University of Adelaide

Research Speaker

Lewis is a Senior Lecturer in Applied Mathematics at the University of Adelaide. Prior to this he was a postdoctoral research fellow in the Vermont Complex Systems Center at the University of Vermont. Lewis studies how information moves over social networks using mathematical models coupled with data science methods. More broadly, his research interests are in computational social science, human dynamics, online social networks, as well as data assimilation and the mathematics of weather and climate.

From data assimilation to data science: My chaotic trajectory: This talk will give an overview of my research, and try to explain how I went from studying dynamical systems and numerical weather prediction to counting tweets and measuring information flow in social networks. Along the way I'll show some of the more interesting results from the research, and attempt to distill any lessons I've learnt. The overarching message will be to learn the things you enjoy, and that everything's going to be ok.

Cecilia González Tokman

University of Queensland

Research Speaker

Cecilia obtained her undergraduate degree in Guanajuato, Mexico and her PhD at the University of Maryland. After postdoctoral research in Canada (UVic) and Australia (UNSW), she joined the University of Queensland, where she is currently a senior lecturer at the School of Mathematics and Physics, and the recipient of an Australian Research Council Discovery Early Career Researcher Award (DECRA). Her research focuses on Dynamical Systems and Ergodic Theory.

A non-linear trajectory through dynamical systems and ergodic theory: Non-autonomous dynamical systems provide very flexible models for the study of time-dependent dynamical systems, with driving mechanisms ranging from deterministic forcing to stationary noise. In this talk, we will discuss recent mathematical developments in the area, motivated by questions arising from the analytical and numerical study of coherent structures and their long-term behaviour.

Jan De Gier

University of Melbourne

Advice Speaker

Jan's research interests are in mathematical physics and statistical mechanics, in particular in the theory and application of solvable lattice models as well as special functions to stochastic processes, quantum spin chains and combinatorics. Jan is a former Editor of the Gazette, organised an AMSI summer school and was inaugural Chair of the Australia and New Zealand Association of Mathematical Physics (ANZAMP). He is currently Head of the School of Mathematics and Statistics at The University of Melbourne and co-Director of the Australian residential Mathematical Research Institute MATRIX.

A mathematician's survival guide: How to make a name for yourself.

Renato Bettiol

Lehman College, City University of New York

Research Speaker

Renato graduated from the University of Sao Paulo, with a Bachelor's degree in Pure Mathematics in 2008 and a Masters in 2010, and moved to the US to work towards a doctoral degree at the University of Notre Dame, under the supervision of Karsten Grove. (PhD awarded 2015). He became a Hans Rademacher Instructor at the University of Pennsylvania until July of 2018, when he assumed his current position of Assistant Professor at the City University of New York. He has been a guest at the Max Planck Institute for Mathematics in Bonn for the fall semester of 2016 and will return for 3 months during the summer of 2019. His fields of research are Differential Geometry and Geometric Analysis, and he works in a broad array of topics including conformal geometry, geometric flows, minimal surfaces, bifurcation in variational problems, rank rigidity, and manifolds with positive or nonnegative curvature. His approach to challenging problems in these areas is often guided by investigating key examples that either arise from symmetry assumptions, or that are amenable to symbolic or numeric high performance computational tools.

Exploring flat worlds: We may define a "flat world" as a metric space that is locally isometric to Euclidean space or one of its quotients by an isometric action. Out of this naive local definition, it is possible to deduce very strong global results that ultimately allow to classify all such flat worlds. Even more, it is possible to determine all the ways in

which they can be deformed through other flat worlds, and prove that the limiting object of any such deformation is again a flat world (of possibly lower dimension). In this talk, I hope to explain these results from an intuitive viewpoint, keeping technicalities to a minimum, but underscoring the exploratory principles that (I believe) apply more generally to other questions in Mathematics.