AMSI VACATION RESEARCH SCHOLARSHIPS 2019–20

EVENT REPORT

AMSI AUSTRALIAN MATHEMATICAL SCIENCES INSTITUTE

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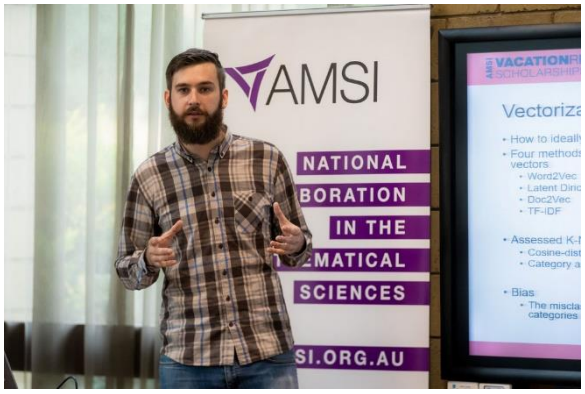
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AMSI Vacation Research Scholarships 2019–20

Experience Life as a Researcher

AMSI Member Universities
December 2019–February 2020

FOREWORD

AMSI Vacation Research Scholarships (VRS) provide undergraduate students from around Australia with the opportunity to spend six weeks at the frontline of their chosen area of the mathematical sciences, developing essential research and communication skills. As one of five premier flagship events hosted each year around Australia, VRS forms part of the Securing Australia's Mathematical Workforce: 2016–2020 agreement between AMSI and the Department of Education.

> "It is a delight to guide and support so many passionate students in their first foray into research. The invaluable skills they develop over their six-week project put them in good stead for successful future careers in the mathematical sciences."

Professor Tim Brown
AMSI Director

The Scholars experience life as researchers while they work closely with a supervisor to complete a project over six weeks. Concluding their summer of research, they present their findings at AMSIConnect, a two-and-a-half-day residential student conference in Melbourne. As an additional exercise they write blog posts relating to the mathematical sciences, giving them experience in scientific writing for broader audiences.

The AMSI Vacation Research Scholarships 2019–20 program was jointly funded by the Australian Mathematical Sciences Institute and the Australian Government's Department of Education.

PROGRAM MANAGER'S REPORT

Chloe Pearse

Australian Mathematical Sciences Institute

Run successfully since 2003, this program inspires undergraduates across Australia to commence a research career by funding second- and third-year students to complete a six-week mathematical sciences research project over their summer break. The scholarships are awarded on a competitive basis, with applicants required to identify a clear research component including outcomes for their project. The Vacation Research Scholar experience is directly linked to research careers through the project supervision provided by research academics at each student's home university. For some students, their Vacation Research Scholarship project also delivers their first academic publication. The 2019/20 program intake was the second largest cohort to date. From 104 applications, 69 students accepted AMSI Vacation Research Scholarships and 66 completed their research projects.

At the end of summer, the Scholars come together in Melbourne to present their research projects and conclusions to their peers and supervisors at AMSIConnect. This provides the Scholars with a valuable professional-development experience in communication and networking skills, and a unique opportunity to meet like-minded students in a mathematical conference setting. A major highlight of the AMSIConnect program is the opportunity for Scholars and Supervisors to network.

The commencement of the formal AMSIConnect 2020 program coincided with the International Day of Women and Girls in Science. AMSI Director Professor Tim Brown opened the conference with an acknowledgment of the significance of the day and the critical role women play in STEM. The careers talks highlighted evolving career and graduate study opportunities for students. Michelle Strumila spoke about her journey from completing an AMSI Vacation Research Scholarship in 2013–14 to currently undertaking a PhD at the University of Melbourne, imparting her lessons learnt along the way. Dr Julian Ugon from Deakin University gave insights on how to create a successful and fulfilling career in the mathematical sciences and spoke of the importance of taking on new challenges. Following the guest speakers, each Scholar delivered a high-quality presentation about their research project—prompting new questions and discussion. As well as formally engaging in research talks, the Scholars had plenty of time for networking at the social events, the icebreaker dodgeball tournament and during break times. The final session given by Professor Tim Brown gave the Scholars a unique opportunity to discuss future study and career opportunities in a group setting followed by the awards for the best research presentations.

Special thanks to our academic panel—Professor Mat Simpson from Queensland University of Technology and Professor Tim Brown from AMSI—for their assistance.

STUDENT PROFILE

Focusing on Mathematical Modelling of Diffusion Processes

Jonah Klowss, Queensland University of Technology

Calculating how long a transport process takes to complete is important in many diverse modelling applications including drug delivery, biological tissue development, transport in groundwater aquifers and various heat conduction applications.

A double degree graduate in Applied and Computational Mathematics and Physics at the Queensland University of Technology, Jonah Klowss teamed up with Dr Elliot Carr to determine how the time required for such processes to transition to within a small specified tolerance of steady state can be calculated accurately without having to solve the governing time-dependent model equations.

"My VRS project looked to extend solutions to this problem beyond a standard diffusion process to diffusion-decay, where some of the quantity (heat, concentration, etc.) is lost depending on how much of that quantity is in the system," Jonah explained. "These kinds of problems are more common in coupled problems, which was the final consideration of the project. The great advantage of the project is that it allows this to be done without ever having to calculate the solution to the differential equation, which is by far the most time-consuming element of the problem."

Jonah considers his VRS-enabled participation at AMSIConnect as "an incredibly unique opportunity to engage with other mathematics students with similar interests as [sic] myself, and to have the chance to present my research to these others in a professional, conference-style environment was incredibly attractive." The outcome for Jonah has been multidimensional. "I walked away from this program with experience in presenting research, an exciting mathematics project, and a bunch of connections to other mathematicians like myself, which is exactly what I had hoped I would experience in the placement."

Building on Jonah's 2019–2020 VRS project, the QUT pair has presented two numerical examples through the arXiv distribution service and open-access archive to confirm their analysis and investigation into the efficacy of the approach.

But is it all about the science? "Synthesising and expressing complicated ideas to people who are not familiar with the topic is an essential skill for any mathematician in either academia or industry," Jonah stated. "I found the practice involved in presenting at AMSIConnect useful in developing these skills (and) I thoroughly enjoyed the satisfaction which came from presenting my work at a conference and engaging with thought-provoking questions from interested members of the audience."

RESEARCH PROJECTS

Sixty-nine second- and third-year undergraduate students were awarded a 2019–2020 AMSI Vacation Research Scholarship. Sixty-six students from 21 universities successfully completed their research projects (three students withdrew from the program due to external circumstances).

Student profiles, research reports and blog posts can be viewed on the AMSI Vacation Research Scholarship website at **vrs.amsi.org.au**

AMSI wishes to acknowledge the generous donation of time, expertise and projects by all Vacation Research Scholarship supervisors–their contribution is integral to the success of the program.

UNIVERSITY	STUDENT	SUPERVISOR/S	PROJECT TITLE
Australian National University	James Morgan	Dr Vigleik Angeltveit	Model Categories
Deakin University	Duong Thuy Dung Le	Dr Dhananjay Thiruvady, Dr Sergey Polyakovskiy	Advanced Solution Techniques to Multi-Component Optimisation Problems
La Trobe University	Julian Ceddia	Dr Anja Slim, Dr Joel Miller	Bouncing Balls on Tables Vibrating with Two Frequencies
	Daniel Roberts	Dr Joel Miller	Ethical Considerations in Vaccine Hesitancy
	Aidan Brohm	Dr Grant Cairns, Dr Yuri Nikolayevsky	Escher Configurations on Triangles
	Grace Klimek	Dr Tomasz Kowalski	Conway's Tiling Groups
	An Ky Duy Nguyen	Dr Yuri Nikolayevsky	Stability of Geodesics on Three-Dimensional Lie Groups
Macquarie University	Matthew Hanna	Dr Georgy Sofronov	Optimising Probability Inequalities and its Theoretical Implications
Monash University	Baihe Zhang	Dr Andrea Collevecchio	The Geometry of Nash Equilibria
	Connor Mallon	Dr David Lee, Professor Santiago Badia	Numerical Simulation of Pressure Drops from Patient-Specific 4D MRIs
	Jia Jia Qian	Dr Julie Clutterbuck	Recent Progress in Planar Curves
	Will Veenman	Professor Nick Wormald	Determining the Metric Dimension of Random Regular Graphs
Murdoch University	George Malone	Dr Alethea Rea, Professor Brenton Clarke	Monte Carlo Simulation Comparing Maximum Likelihood and L2 Estimates for ACTH Levels in Equids (Horses)
	Louise Branch-Smith	Associate Professor Nicola Armstrong	Getting the Most Out of Electropherograms

Queensland University of Technology	Caren Rattray	Associate Professor Michael Bode	The Perverse Incentives of Strong Enforcement
	Jonah Klowss	Dr Elliot Carr	Finite Transition Times for Coupled Linear Diffusion Problems
	Joshua Wilson	Dr Elliot Carr, Professor Timothy Moroney	Computational Modelling Using Exponential Integrators
	Michael Carr	Assistant Professor Chris Drovandi, Professor Matthew Simpson	Advanced Bayesian Statistical Inference Methods for Simulation-Based Models in Cell Biology
	Reuben Hill	Dr Pascal Buenzli	Modelling of Tissue Formation on 3D-Printed Scaffolds
	Stefano Giannini	Associate Professor Petrus Heijster	Multi-Pulse Solutions in a Generalised Fitzhugh-Nagumo Model
RMIT University	Lucky Antonopoulos	Dr Nicolas Menicucci	Continuous-Variable Wigner Representation of Gottesman-Kitaev-Preskill-Encoded Quidits
	Bayan Khalili	Dr Alice Johnstone	Comparison of Pre-Processing Normalisation Techniques Used in the Bioinformatic Analyses of RNA-Seq Data
	Stephanie Fuser	Associate Professor Stephen Davis	Global Sensitivity Analysis of a Model for Cyprinid Herpes Virus 3 as a Biocontrol Agent of Common Carp
Swinburne University of Technology	Holly Casey	Associate Professor Federico Frascoli	Understanding the Mechanisms of Fate Determination During T-Cell Development: A Mathematical Model

"The most enjoyable part for me was feeling like I had ownership of my project. My supervisor did an excellent job of guiding the research but still allowing me autonomy to pursue areas that I found interesting."

Nicholas Maurer
The University of Queensland

The University of Adelaide	Yuchen Jiang	Professor Finnur Larusson	Exploring Toposes
	Christina Tait	Dr Jonathan Tuke	Association Network of World War One Primary Sources
	Eunice Blessica Yuwono	Dr Edward Green, Dr Emily Hackett-Jones	Mathematical Modelling of Post-Transcriptional Regulation of Gene Expression
	Jesse Tonkin	Dr Barry Cox, Dr Mike Chen	3D Printing for Biofabrication
	Lin Jiang	Dr Edward Green, Dr Mike Chen	Fixing Sore Knees: Mechanics of Artificial Cartilage
	Megan Crossing	Professor Matthew Roughan	Analysis of Information Entropy in Constructed Languages
	Sean McGowan	Dr Jonathan Tuke, Dr Mike Chen	PDE Discovery Using Machine Learning
The University of Melbourne	Yong See Foo	Dr Heejung Shim	A Comparison of Bayesian Inference Techniques for Sparse Factor Models
	Kulunu Dharmakeerthi	Professor Kate Smith-Miles	Generating New Instance Spaces for Stress-Testing Classification Algorithms
	Rohan Hitchcock	Dr John Bamberg, Professor Michael Giudici	Alternative Construction of Groups of Type E6
	Matthew Walker	Dr Jesse Collis, Professor John Sader	Vector Spherical Harmonics and Their Application to Nanoparticles Trapped in an Acoustic Field
The University of New England	Ana Vintila	Professor Brenda Vo	Study and Application of Concept-Extraction Algorithms in Statistical and Programming Sciences
	Nicholas Garrett	Dr Matthew Cooper	Curve Shortening Flow and Grayson's Theorem

"I enjoyed being able to experience research so that my decision to continue to a masters was much easier to make."

Christina Tait
The University of Adelaide

The University of Newcastle	Aditya Joshi	Professor Brian Alspach, Professor George Willis, Associate Professor Jeffrey Hogan	Fourier Analysis on Graphs
	Jack Berry	Dr Stephan Tornier	Groups Acting on Trees Without Involutive Inversions
	Thomas McCarthy McCann	Dr Ali Eshragh	Nexus Between Randomised Numerical Linear Algebra and Big Time Series Data
	Luke Yerbury	Dr Ali Eshragh, Dr Glen Livingston Jr	A New Algorithm for Analysing Big Time Series Data
	Mikayla Goodwin	Dr Robert King	Effect Size Measures, Sampling Behaviour and Use Across Fields of Study
	Thomas Vandenberg	Associate Professor Mike Meylan	Bragg Edge Neutron Strain Tomography
The University of Queensland	Jonathan Wilton	Professor Dirk Kroese	Design of Neural Networks Using Randomised Algorithms
	Nicholas Maurer	Associate Professor Tony Roberts	Solving 2D Unconditional MFPT Problems with Arbitrary Confining Geometries
The University of Sydney	Cameron Eggins	Associate Professor Stephan Tillmann	Convex Projective Surfaces
	Kenneth Guo	Dr Zhou Zhou	Optimal Exit Times in a Declining Industry
	Martin Gossow	Professor Georg Gottwald, Dr Lachlan Smith	Mixing, Twisty Puzzles, and the Fractal Geometry of Piecewise Isometries
	Samantha Chew	Professor Jean Yang	Methods Towards Precision Medicine
	Steven Condell	Dr Jonathan Spreer	Graph-Encoded Manifolds
	Tony Wang	Dr Nathan Brownlowe, Dr Zahra Afsar	C*-Algebras of Self-Similar Groupoid Actions on Higher Rank Graphs
	Yee Chin	Dr Nathan Brownlowe	Compact Quantum Groups
The University of Western Australia	David Perrella	Professor Luchezar Stoyanov	Inner Product Spaces on Subsets of the Powerset of Riemannian Manifolds
	Timothy Chapman	Professor Inge Koch	Feature Extraction of Wheat Data from Genotypes and Peptide Sequences
	David Adams	Professor Enrico Valdinoci	Can Machines Learn Like Fish? An Application of Simulated Multi-Timescale Nexting
	Aaron Jenkins	Professor Michael Giudici	Understanding and Exploring Skew Morphisms
	Luke Robinson	Professor Snezhana Abarzhi	Interface Stability and Interplay of Surface Tension and Inertial Stabilisation Mechanisms

University of South Australia	Zhou Dai	Professor Jiuyong Li	Study of Causal Inference Techniques for Data-Driven Personalised Decision-Making
University of Tasmania	Alex Oakley	Professor Anya Reading, Professor Larry Forbes	Appraisal of Machine Learning Evaluation Techniques in the Context of Glacier-Generated Events
University of Technology Sydney	Alexander Hiller	Professor Anthony Dooley	Harmonic Analysis on Lie Groups and Applications to Optical Communications
	Rory Jacques	Professor Anthony Dooley	Lie Symmetries of Stochastic Differential Equations
University of Wollongong	Amelia Lee	Dr Ben Whale	A Computational Approach to the Conjugacy Problem
	Dion Nikolic	Professor Aidan Sims, Professor Glen Wheeler	Fredholm Operators and Differential Equations
	Dean Noble	Professor Glen Wheeler	Nonlinear Galerkin Methods
	Dylan Green	Dr Maureen Edwards	Compactly Supported Solutions Through Symmetries
Western Sydney University	Daniel Stratti	Dr Laurence Park	Rank Embeddings for Detecting Ranking Outliers

"The bringing together of many mathematicians from different areas inspired me to push myself further as a researcher."

David Perrella
The University of Western Australia

FEATURED PROJECT

Understanding the Mechanisms of Fate Determination During T-Cell Development

Holly Casey, Swinburne University of Technology

ABSTRACT

This project created a model using MATLAB to replicate patterns of T-cell numbers during proliferation. The model was used to understand how the number of cells change with different initial cell numbers, and different probabilities of individual cell death and division. In particular, the point of activation when a progeny of cells begins dividing, and the time when cell number had reached its peak, were studied.

INTRODUCTION

T Cells are an import class of immune cells that attack pathogens and toxins in the body. This research specifically modelled naïve CD8+ T cells, which had become activated and began [sic] a process of rapid proliferation. Activation of a naïve CD8+ T cell occurs when another antigen presenting cell triggers the T cell, which causes it to start rapid division (Zhang and Bevan, 2011).

A model was created to study cell number, and rates of death and division, for activated CD8+ T cells. The model was developed using MATLAB and accepted different inputs such as varying probability for death and division, and initial cell number. The aim of this project was to study theoretical cell number over time and compare it to existing data, while investigating the role of single cells' properties in collective effects.

By understanding and being able to predict cell number it is hoped this information can be used in therapeutics for new treatments reliant on knowing how different cell properties will impact the overall immune response. It was found that the probability of death for individual cells had the most influence on cell number.

CONCLUSION

The number of dividing cells is greatly influenced by the individual probability of death of a cell, and to a lesser extent, the probability a cell will divide. The time cells exist in a certain generation is also influenced by the probability of death and division, with higher values meaning less time spent in a generation, except when the number of cells is significantly low (<2).

Holly's full research report can be viewed at: **vrs.amsi.org.au/student-profile/holly-casey**

FEATURED BLOG

Bouncing Balls on Oscillating Tables

Julian Ceddia

La Trobe University

I know what you're thinking…

"Bouncing balls? Bouncing balls on oscillating tables? Err.. ok… cool project man. Take the easy way out why don't ya?"

That was me as well. Six weeks ago; when I was about to embark on my first "mathematical research project". I thought I hit the jackpot, scoring a six-week scholarship to take on a project I could finish in a few days. I can't recall the last time I'd been so wrong; fast forward until the night before the report's due, and here I am assembling the last few graphs and figures and shoehorning them into my final report.

My task was to write a program that simulated a ball bouncing on a vertically oscillating table, and then use that simulation to explore different kinds of behaviour exhibited by the system. If I had to describe the ensuing research in as few words as possible, two words, forming a concept that Neo (aka Mr Anderson) should be more than familiar with, come to mind…

"Rabbit hole"

Who would have thought that such a simple, one-dimensional system could flaunt a vast array of rich and complex behaviours? It was difficult to maintain focus on a clear goal; it was easy to get distracted by a new pretty pattern, or some odd, unexpected modes of periodic motion.

The simulations were great. They were fascinating, and I'd only scratched the surface. But I'm an engineer at heart and simulations alone would not suffice. I remember the shock that slapped my maths professor in the face when I told him I wanted to BUILD the thing IRL. With as much curiosity as he had hesitancy, he agreed to let me give it a go. With a few lengths of aluminium, a 3D printer, and a bit of elbow grease I managed to conjure up something that actually seemed to work. We had a way to realise the perpetually bouncing ball I'd been dreaming of for weeks and it was really, really satisfying.

Anyway, the project has drawn to a close, and we're left with this hunk of metal that moves up and down faster than the wings of a hummingbird falling down a vacuum tube, and neither me, nor my supervisor, have the heart to just let it sit there gathering dust. So what does the future hold? More simulations and more perpetually bouncing balls 😊

Julian's research report can be viewed at: **vrs.amsi.org.au/student-profile/julian-ceddia/**

PARTICIPANT BREAKDOWN

UNIVERSITY	
Australian National University	1
Deakin University	1
La Trobe University	5
Macquarie University	1
Monash University	4
Murdoch University	2
Queensland University of Technology	6
RMIT University	3
Swinburne University of Technology	1
The University of Adelaide	7
The University of Melbourne	4
The University of New England	2
The University of Newcastle	6
The University of Queensland	2
The University of Sydney	7
The University of Western Australia	5
University of South Australia	1
University of Tasmania	1
University of Technology Sydney	2
University of Wollongong	4
Western Sydney University	1

UNDERGRADUATE YEAR LEVEL		
2nd year	19	29%
3rd year	47	71%

GENDER		
Female	18	27%
Male	48	73%

RESIDENCY STATUS		
Australian Citizen	58	88%
Permanent Resident	2	3%
Student Visa	5	7%
New Zealand Citizen	1	2%

STATE/TERRITORY		
ACT	1	2%
NSW	23	35%
QLD	8	12%
SA	8	12%
TAS	1	2%
VIC	18	27%
WA	7	10%

ABORIGINAL AND TORRES STRAIT ISLANDER		
Yes	0	0%
No	66	100%

66 students

from **21 universities**

completed a 2019–20

AMSI Vacation Research Scholarship

"I enjoyed meeting other like-minded people and being able to share our excitement about maths and encourage each other with our projects."

Martin Gossow
The University of Sydney

AMSICONNECT

Near the completion of their projects, all VRS students were funded to travel and stay at Queen's College, the University of Melbourne from 10–12 February to participate in an exclusive residential conference.

"AMSIConnect fostered a very positive attitude towards learning and discussion about other areas of mathematics. There was a very communal feeling when everyone shared their own experiences with their project and their struggles and successes."

Tony Wang
The University of Sydney

NETWORKING EVENTS

Scholars were welcomed to campus on Monday afternoon and kickstarted their networking with small team icebreaker activities and the annual dodgeball tournament. They had the opportunity to mingle and discuss their research and their mathematics journeys further at the Monday evening garden pizza party and a seated BBQ dinner on Tuesday.

"The AMSIConnect conference was an experience like no other"

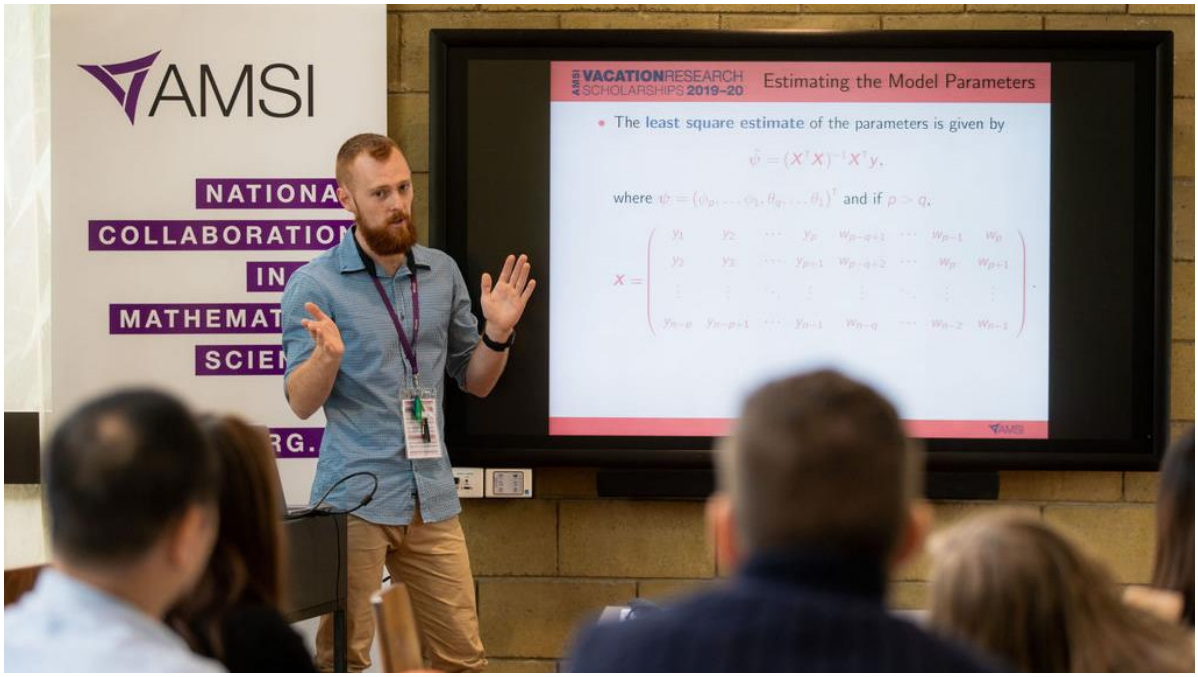
Jonathan Wilton
The University of Queensland

STUDENT RESEARCH PRESENTATIONS

Scholars presented their research findings to fellow VRS students and their supervisors over the course of Tuesday and Wednesday. For the majority it was their first time presenting in a conference setting. Presentations were run in parallel sessions with students exposed to research from the pure/theoretical, applied and statistics fields of the mathematical sciences.

22 pure **26 applied** **18 statistics**

In addition to their 12-minute talks, Scholars had the opportunity to further develop their science communication skills by participating in Q&A sessions as well as informal discussions with their peers during the catered breaks.



"It was really interesting to see such a wide variety of presentations and get a sense of what is happening in other areas of mathematics."

Dylan Green
University of Wollongong

WOMEN IN STEM

Day One of AMSIConnect coincided with the International Day of Women and Girls in Science. The conference was opened by AMSI Director Professor Tim Brown who emphasised the importance of diversity and gender equity in the mathematical sciences and promoted discussion on how to encourage it in practice.

BEST PRESENTER COMPETITION

The quality of student presentations waas high across the board with session chairs consistently reporting how impressive the Scholars were at communicating their research. The following Scholars were voted by their peers as the best presenters across the two days:

- **Tony Wang, The University of Sydney**
  C*-Algebras of Self-Similar Groupoid Actions on Higher Rank Graphs
- **Nicholas Maurer, The University of Queensland**
  Solving 2D Unconditional MFPT Problems with Arbitrary Confining Geometries
- **Megan Crossing, The University of Adelaide**
  Analysis of Information Entropy in Constructed Languages

"I enjoyed meeting like-minded students from across Australia who shared my passion for mathematics."

Megan Crossing
The University of Adelaide

GUEST SPEAKERS

Three guest speakers each in different stages of their careers shared their own mathematical sciences journeys, offering guidence and advice about the options available to the Scholars after their honours and masters studies.

- Life as a PhD Student
  Michelle Strumila, The University of Melbourne
- Life as a Researcher
  Dr Julien Ugon, Deakin University
- Career Advice Q&A
  Professor Tim Brown, Australian Mathematical Sciences Institute

Michelle Strumila and Dr Julien Ugon gave Scholars a further insight into life as a researcher from the perspectives of a PhD student and an academic.

Michelle–a 2013–14 AMSI Vacation Research Scholar–outlined the process she followed to pick her thesis topic and to find a PhD supervisor as well as what a typical day looks like for her. Julien discussed the different types of research he has undertaken and the benefits of building networks and collaborating.

For the last session of the conference Professor Tim Brown facilitated an interactive careers advice session where Scholars could get candid answers to their questions.

FEEDBACK

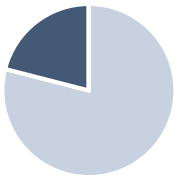
58%

Fifty-eight per cent of Vacation Research Scholars completed the online survey to provide their feedback and comments on the program and AMSIConnect.

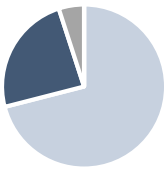
9.2

In rating their overall experience at the event on a scale of 1 to 10, where 1 is poor and 10 is excellent, the respondents' average rating was 9.2

UNDERTAKING A RESEARCH PROJECT WAS POSITIVE AND REWARDING	
Strongly Agree	79%
Agree	21%
Neutral	0%
Disagree	0%
Strongly Disagree	0%
Prefer not to Say	0%

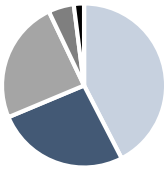


PRESENTING AT AMSICONNECT WAS POSTIVE AND REWARDING	
Strongly Agree	71%
Agree	24%
Neutral	5%
Disagree	0%
Strongly Disagree	0%
Prefer not to Say	0%

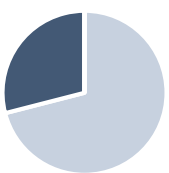


VRS HAS STRENGTHENED MY RESOLVE TO CONTINUE ONTO A MASTERS/HONOURS COURSE	
Strongly Agree	58%
Agree	21%
Neutral	21%
Disagree	0%
Strongly Disagree	0%
Prefer not to Say	0%

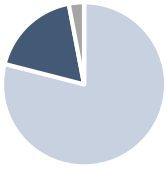
I MADE USEFUL CONTACTS AND NETWORKS AT AMSICONNECT	
Strongly Agree	42%
Agree	26%
Neutral	24%
Disagree	5%
Strongly Disagree	2%
Prefer not to Say	0%



THIS WAS A GOOD OPPORTUNITY TO EXPLORE MY CHOSEN AREA OF MATHEMATICS	
Strongly Agree	71%
Agree	29%
Neutral	0%
Disagree	0%
Strongly Disagree	0%
Prefer not to Say	0%

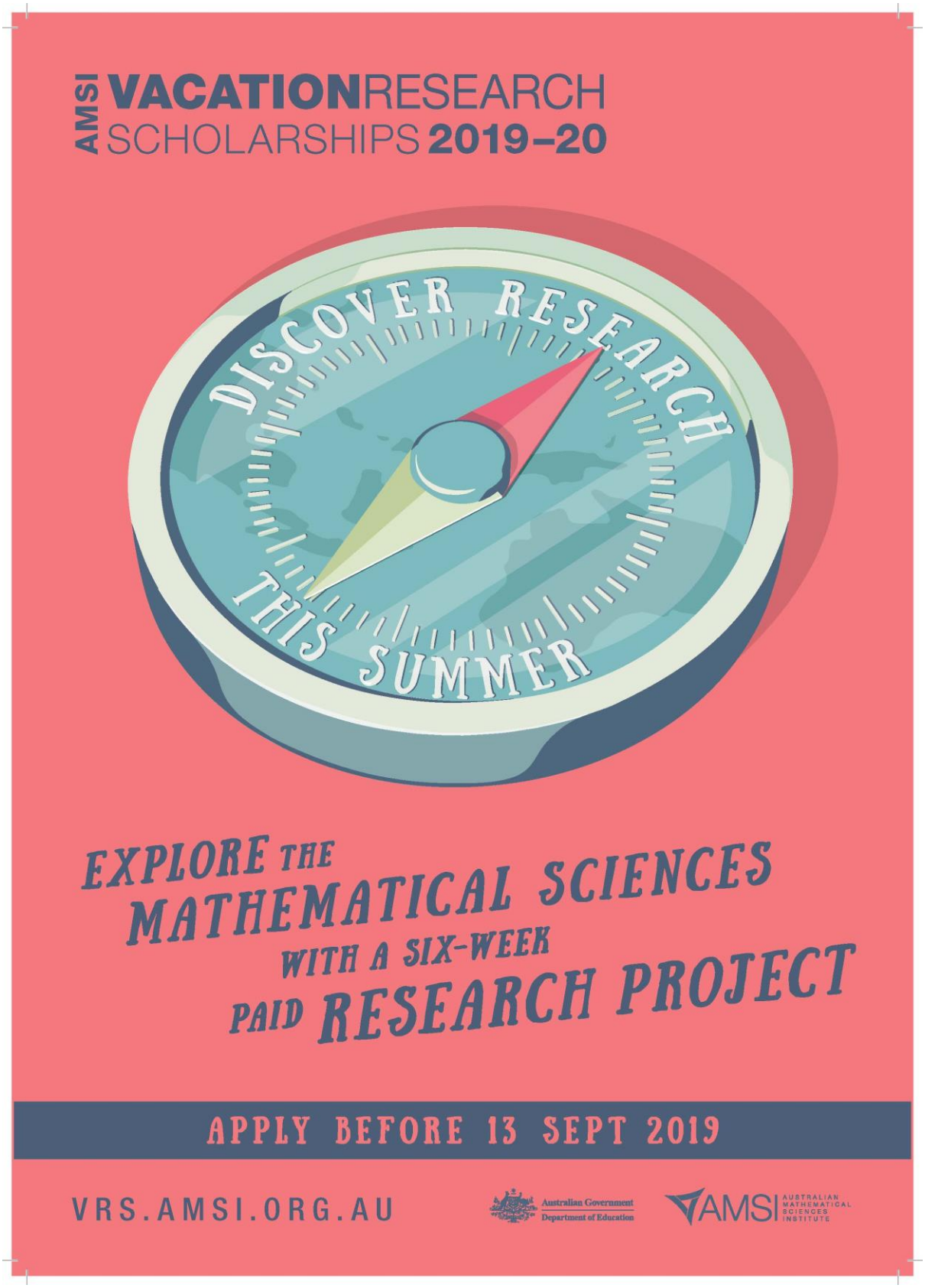


AMSICONNECT WAS WELL ORGANISED	
Strongly Agree	79%
Agree	18%
Neutral	3%
Disagree	0%
Strongly Disagree	0%
Prefer not to Say	0%



"Keep this program running!! It's amazing!"

James Morgan
Australian National University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DISCOVER RESEARCH THIS SUMMER
EXPLORE THE MATHEMATICAL SCIENCES WITH A SIX-WEEK PAID RESEARCH PROJECT
APPLY BEFORE 13 SEPT 2019
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