Max Carter
Curriculum Vitae

Contact Information

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Personal Information

Birth: 19th July 1998 in Alice Springs, Northern Territory, Australia.
Languages: English (Mother), German (A1).
Nationality: Australian.

Research Interests

- Structure theory of locally compact groups.
- Totally disconnected locally compact groups.
- Unitary representation theory of locally compact groups.
- Operator algebras, particularly algebras associated to locally compact groups.

Education

2021 – Present   **Master of Philosophy (Mathematics).**
The University of Newcastle.
- Thesis: Unitary representations and group algebras of scale groups.

2020   **Bachelor of Mathematics (Honours), w/ Honours Class I and the University Medal.**
The University of Newcastle.
- Thesis: On two properties of totally disconnected locally compact groups.
- Marks: 94% WAM (combined with Bachelor degree), 99% thesis mark.
- Awards & Honours: the University Medal, the Faculty of Science Medal, Graduate Speaker (akin to "valedictory speaker"), placed on Faculty of Science commendation list.

2017 – 2019   **Bachelor of Mathematics, with Distinction.**
The University of Newcastle.
- Awards & Honours: the Ivan Lincoln Rose Prize in Applied Mathematics, the Mathematics Prize in 3000 Level Mathematics, placed on the Faculty of Science Commendation list in 2017, 2018 and 2019.

2011 – 2016   High School Certificate.
Maitland-Grossman High School (in East Maitland, NSW, Australia).

Publications

In preparation

[4] *Unitary representations of scale and contraction groups*, journal article.

[iii] *Unitary representations and group algebras of scale groups*, Master's thesis, The University of Newcastle.

Published journal articles

[3] (with G. Willis) *Homomorphic images of locally compact groups acting on trees and buildings*, Monatshefte für Mathematik, early access, (2022), 16 pages, https://doi.org/10.1007/s00605-022-01690-5.

[2] (with G. Willis) *Decomposition theorems for automorphism groups of trees*, Bulletin of the Australian Mathematical Society, **103(1)**, (2021), 104-112, https://doi.org/10.1017/S0004972720000465.

[1] (with S. Tornier and G. Willis) *On free products of graphs*, Australasian Journal of Combinatorics, **78(1)**, (2020), 154-176, `https://ajc.maths.uq.edu.au/pdf/78/ajc_v78_p154.pdf`.

Other articles

[ii] *On two properties of totally disconnected locally compact groups*, Honours thesis, The University of Newcastle, (2020). Available at: `https://max-carter-math.github.io/publications.html`.

[i] Report on *Free products of graphs* for AMSI Vacation Research Scholarship (2019). Available at: `https://vrs.amsi.org.au/student-profile-max-carter/`.

AWARDS & HONOURS

Dec 2021	**Graduate Speaker**. College of Engineering, Science and Environment, The University of Newcastle. I was chosen to give the "graduate address" at my undergraduate graduation ceremony: a speech on behalf of all graduates in my graduating cohort, akin to a "valedictory address".
Aug 2021	**University Medal**. Issued by The University of Newcastle. The award of a University Medal is an honour made only when there is a candidate of sufficient merit. To be considered for this award, a graduate must have a consistent record of exceptional academic achievement at all levels of their degree program, and qualify with the highest level of the degree.
Jun 2021	**Faculty of Science Medal**. Issued by the Faculty of Science, The University of Newcastle. Awarded by the Faculty of Science at The University of Newcastle to students who achieved outstanding merit throughout the course of their Bachelor and Bachelor Honours degrees.
Oct 2020	**Mathematics Prize in 3000 Level Mathematics**. Issued by the School of Mathematical and Physical Sciences, The University of Newcastle. Awarded annually to the student with the best performance, if of sufficient merit, in level 3000 mathematics courses at The University of Newcastle. The prize was awarded to me for my studies during 2019.
Apr 2019	**Ivan Lincoln Rose Prize in Applied Mathematics**. Issued by the School of Mathematical and Physical Sciences, The University of Newcastle. Awarded annually to the student with the best performance, if of sufficient merit, in level 3000 applied mathematics courses at The University of Newcastle. The prize was awarded to me for my studies during 2018.
2017 − 2020	Placed on the Faculty of Science Commendation List every year between 2017 and 2020 inclusive. Issued by The University of Newcastle.
2018 − 2020	A part of the Bachelor of Mathematics Merit Pathway. The University of Newcastle.
Nov 2016	Award for Outstanding Achievements in Physics and Mathematics. Issued by Maitland-Grossman High School.
Nov 2016	Award for High Achievements in HSC Mathematics. Issued by Maitland-Grossman High School.

Talks

20 June 2022	*Scale groups and their unitary representations.* **Invited talk**, UCLouvain group theory seminar, Louvain-la-Neuve, Belgium.
1 Apr 2022	*Unitary representations and the type I property of groups acting on trees.* **Invited talk**, Symmetries in Newcastle seminar, The University of Newcastle.
17 Mar 2022	*Unitary representations and group algebras of scale groups.* Confirmation seminar, The University of Newcastle.
13 Dec 2021	*Graduate Address.* College of Engineering, Science and Environment graduation ceremony, The University of Newcastle.
16 Sep 2021	*Representation theory of locally compact groups: spherical and induced representations.* Local seminar, The University of Newcastle.
18 Jan 2021	*Cartan-like decompositions of totally disconnected locally compact groups.* Australian Algebra Conference (AAC04) (online).
15 Jan 2021	*Cartan-like decompositions of totally disconnected locally compact groups.* Postgraduate Group Theory Conference 2020 (online).
26 Nov 2020	*Two properties of totally disconnected locally compact groups.* Honours thesis seminar, The University of Newcastle.
24 Jul 2020	*Two properties of totally disconnected locally compact groups.* Local seminar, The University of Newcastle.
7 Nov 2019	*Decomposition theorems for automorphism groups of trees.* Local seminar, The University of Newcastle.
8 Feb 2019	*Free products of graphs.* AMSI Connect Conference, University of Melbourne.
15 Dec 2018	*Free products of graphs.* Local seminar, The University of Newcastle.

Conference Attendance

7-10 Dec 2021	65th Annual Meeting of the Australian Mathematical Society. The University of Newcastle, Australia.
29 Nov – 3 Dec 2021	Groups and Geometries. Online, hosted by MATRIX, Creswick, Australia.
17-19 Nov 2021	Australia Algebra Conference (AAC05). Online, hosted by the University of Western Australia, Australia.
15-20 Aug 2021	Totally Disconnected Locally Compact Groups via Group Actions. Online, hosted by Banff Research Station, Banff, Canada.
2-13 Aug 2021	Young Mathematicians in C*-algebras (YMC*A 2021). Online, hosted in Münster, Germany.
16-19 Feb 2021	Operator Algebras and their Applications. Online, hosted by IPM, Iran.
18-19 Jan 2021	Australia Algebra Conference (AAC04). Online, hosted by the University of Melbourne, Australia.
11-15 Jan 2021	Postgraduate Group Theory Conference 2020. Online, hosted by the University of Southampton, UK.

15-18 Dec 2020	Locally Compact Groups Acting on Discrete Structures (WinSum School). Online, hosted by the Bernoulli Centre, EPFL, Lausanne, Switzerland.
7-11 Dec 2020	64th Annual Meeting of the Australian Mathematical Society. Online, hosted by the University of New England, Armidale, Australia.
6-31 Jan 2020	AMSI Summer School 2020. La Trobe University, Melbourne, Australia.
6-8 Feb 2019	AMSI Connect Conference. University of Melbourne, Australia.

Scholarships & Grants

July 2022	Accommodation funding to attend "Operator algebras, dynamics and groups" conference. 4200 Kr. DKK, funded by the University of Copenhagen mathematics department.
2021 – 2022	**Australian government Research Training Program (RTP) scholarship**. $60951 AUD, awarded by the Australian Government and The University of Newcastle.
Dec 2020 – Feb 2021	Undergraduate summer research scholarship. $3000 AUD, awarded by The University of Newcastle.
Dec 2019 – Feb 2020	Faculty of Science summer research scholarship. $3000 AUD, awarded by The University of Newcastle.
Jan 2020	AMSI summer school travel and accommodation grant. $\sim$ $2000 AUD, funded by the Australian Mathematical Sciences Institute.
Dec 2018 – Feb 2019	AMSI vacation research scholarship. $3000 AUD, awarded by the Australian Mathematical Sciences Institute.

Teaching Experience

Student mentoring (2021 – Present)
I provide mentoring to advanced undergraduate and postgraduate mathematics students studying in various areas of pure mathematics.

The University of Newcastle (2019 – Present)
I have run workshops and tutorials for a variety of mathematics courses at The University of Newcastle. The role includes marking assessments and invigilating in class exams. Listed below are the courses I have taught.

MATH1001 - Preparatory Studies in Mathematics.
Semesters: Sem 1 2019, Sem 2 2019, Sem 2 2020, Sem 1 2021.

MATH1002 - Foundational Studies in Mathematics.
Semesters: Sem 2 2019, Sem 1 2021.

MATH1120 - Mathematics for Engineering, Science & Technology 2.
Semesters: Sem 2 2020, Sum 2 2021, Sum 2 2022.

MATH1510 - Discrete Mathematics.
Semesters: Sem 2 2021

MATH2310 - Calculus of Science and Engineering.
Semesters: Sem 2 2020, Sem 1 2021, Sem 2 2021.

MATH2330 - Real Analysis.
Semesters: Sem 1 2020.

MATH2340 - Linearity and Continuity.
Semesters: Sem 1 2020.

MATH3205 - Fourier Analysis.
Semesters: Sem 1 2021 (marking and one-on-one consultations only).

MATH4101 - Topological Groups.
Semesters: Sem 2 2021 (marking only).

Private mathematics tutoring (2018 – Present)
I provide private mathematics tutoring for university level mathematics students from first year undergraduate through to postgraduate level. The job involves preparing and giving lessons to students and assisting them with their studies outside of class time. Lessons are run either face-to-face or online.

Event Organisation

Dec 2021 – Present	**Founder and co-organiser of the Australian Postgraduate Algebra Colloquium**. See the APAC website for more details on the colloquium: `https://www.apacmath.org`.
Aug 2021 – Jan 2022	Co-host of the $(GT)^2$ Graduate Symposium. See the $(GT)^2$ website for more details on the symposium: `https://www.maths.usyd.edu.au/u/GTSquared/`.

Professional Affiliations & Societies

2021 – Present	Member of the Australian and New Zealand Association of Mathematical Physics.
2019 – Present	Member of the Australian Mathematical Society.

Volunteer Experience

2021 – 2022	The University of Newcastle Peer Mentor Program.
14 Jan 2021	National Youth Science Forum. Assisted running a workshop for high school students covering aspects of symmetry and group theory.
2019 – 2020	The University of Newcastle Maths Club. Co-founded the UoN Maths Club and assisted organising and running various events.

Last Updated

9th April 2022 in Newcastle, Australia.