Dr. Yeeka Yau

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Nationality: Australian
Personal webpage
School of Mathematics and Statistics
The University of Sydney, Australia

Employment History

Lecturer (Education Focused) 2025 -
School of Mathematics and Statistics, The University of Sydney, Australia

Learning Success Advisor (Mathematics) 2024
Learning Hub Mathematics, The University of Sydney, Australia

Assistant Professor (Tenure-track) July 2023 - Dec 2023
University of North Carolina Asheville, Asheville, North Carolina, USA

Visiting Assistant Professor 2022 - 2023
Furman University, Greenville, South Carolina, USA

Postdoctoral Research Associate 2021-2022
The University of Sydney, Australia

Associate Lecturer 2019-2020
Mathematics Learning Centre, The University of Sydney, Australia

Summer Intensive Lecturer 2018, 2020
The University of Sydney, Australia

Visiting Positions

Visiting Researcher April/May 2022
LaCIM Université du Québec à Montréal, Canada
Mentor: Professor Christophe Hohlweg

Education

Ph.D. in Pure Mathematics, *The University of Sydney, Australia* 2017–2021
- Advisor: A/Prof. James Parkinson
- Thesis: Automatic Structures for Coxeter Groups (link)

BS.c. (Adv Maths) Honours in Pure Mathematics, *The University of Sydney, Australia* 2012–2016
- Grade: Honours Class I
- Advisor: A/Prof. James Parkinson
- Thesis: Automata for Coxeter Groups

Publications and Preprints

Bilinear maps on the ring of strictly upper triangular matrices 2025
(J. Bounds, S. Dayton, R. Richardson, Y. Yau) pdf
(Submitted)

Ultra-low elements and Join Irreducible gates in Coxeter groups 2025
(Y. Yau) pdf
(Submitted)

A pair of Garside shadows 2024
(P. Przytycki and Y. Yau) pdf
Algebraic Combinatorics, vol 7, no. 6, p1879-1885, 2024

An artificial neural network approach to finding the key length of the Vigenère cipher. 2023
(C. Millichap, Y. Yau) pdf
Cryptologia, 1-17, 2024

Modifying twist algorithms for determining the key length of a Vigenère cipher. 2023
(C. Millichap, Y. Yau, A. Pate and M. Carns) pdf
Cryptologia, 1-16, 2023

Cone types, automata and regular partitions in Coxeter groups 2022
(J. Parkinson and Y. Yau) online version
Advances in Mathematics, vol 398, 2022

Coxeter Systems for which the Brink-Howlett automaton is minimal 2019
(J. Parkinson and Y. Yau) online version
Journal of Algebra, vol 527, p437-446

Research Grants and Funding

Functional Identities, Nilpotent Rings and Garside Shadows 2023-2025
NSF LEAPS-MPS Award: $197,154 USD
Jordan Bounds (Primary Investigator)
Yeeka Yau (Primary collaborator and Senior Personnel)

Start up Funding 2023
UNC Asheville: $13,000 USD

Awards

- **T.G. Room Medal** for most outstanding Pure Mathematics PhD thesis 2021
  University of Sydney, Australia
- **Australian Government Research Training Stipend (PhD) Full Scholarship** 2017-2021
- **The David G A Jackson Prize** for originality and creativity in Pure Mathematics 2016
  University of Sydney, Australia
- **Norbert Quirk Prize No. IV** for best essay by an Honours student 2016
  University of Sydney, Australia
- **The Rolf Adams Prize** for best Pure Mathematics Honours presentation 2016
  University of Sydney, Australia

Teaching and Educational Innovation

As a Learning Success Advisor (mathematics) I have taught the following Supplementary Learning Tutorials, duties include creating problem sets and solutions, detailed explanation of theory and tutorial problems:

- MATH1062 - Mathematics 1B (Differential Equations and Statistics) 2024
- DATA1001/1901 - Foundations of Data Science 2024
- PSYC2012 - Statistics and Research Methods for Psychology 2024

Courses taught at UNC Asheville:

- STAT225 - Calculus-Based Statistics 2023
- MATH167 - Precalculus 2023

Courses taught at Furman University:

- MTH120 - Introduction to Statistics 2022, 2023
- MTH150 - Calculus I 2022
- MTH145 - Calculus for Management, Life and Social Sciences 2023

Courses taught at The University of Sydney:

- MATH1002 Linear Algebra (1st year) 2020 Summer School
- MATH1004 Discrete Mathematics (1st year) 2018 Summer School

As an Associate Lecturer in the Mathematics Learning Centre at the University of Sydney, I have also taught the following courses as small group workshops (10-15 students) covering theory and example problems:

- Statistics Bridging course (preparatory course for students embarking on statistics intensive degrees)
- MATH1013 Mathematical Modelling (1st year)
- MATH1004 Discrete Mathematics (1st year)
- MATH1014 Intro to Linear Algebra (1st year)
- MATH1111 Intro to Calculus (1st year)

I have been a tutor for the following courses at the University of Sydney (duties include leading tutorial and practice classes, explaining homework problems and solutions and marking assignments):

- MATH1014 Intro to Linear Algebra (1st year Fundamental) 2016
- MATH1003 Integral Calculus and Modelling (1st year) 2016 Summer School
- MATH1002 Linear Algebra (1st year) 2017
- MATH1001 Differential Calculus (1st year) 2017
- MATH2968 Discrete Maths and Graph Theory (2nd year Advanced) 2017
- MATH2022 Abstract and Linear Algebra (2nd year) 2018, 2019
- MATH2023 Analysis (2nd year) 2018
- MATH3069 Geometry and Topology (3rd year) 2018
- MATH3066 Algebra and Logic (3rd year) 2019
- MATH1023 Multivariable Calculus and Modelling (1st year) 2019
- MATH1013 Mathematical Modelling (1st year Fundamental) 2019

Students Supervised

Devin Bryant, Sam Housand, Regan Richardson and Sam Dayton (joint with Jordan Bounds) 2023-ongoing
Functional Identities, Nilpotent Rings and Garside Shadows
Furman University, SC, USA

Alyssa Pate and Morgan Carns Summer 2023
Finding the key length of Vigenère ciphers
Furman University, SC, USA

Selected Talks

A pair of Garside shadows. Dec 2024
Joint meeting of the AMS, NZMS and AustMS
Auckland, New Zealand

Modifying twist algorithms for determining the key length of a Vigenère cipher. Nov 2023
Cryptology Educators Seminar, online

The Mathematics of Hearing Nov 2022
Math & Munchies Series
Furman University, SC, USA

Cone Types, Automata and Regular Partitions in Coxeter groups
Spring Topology and Dynamics Conference Mar 2023
Rhodes College (online)
Algebra and Combinatorics Seminar Apr 2022
LaCIM Université du Québec à Montréal, Canada
Groups and Geometries (MATRIX Conference) Dec 2021
Sydney, Australia

Coxeter Systems for which the Brink-Howlett automaton is minimal
Symmetries in Newcaste (invited) May 2020
University of Newcastle, Australia
Algebra and Combinatorics Seminar Feb 2019
North Carolina State University, USA

62nd Annual Meeting of the Australian Mathematics Society Dec 2018
University of Adelaide, South Australia

Introduction to Automatic Groups Apr 2019
Student Algebra Seminar
University of Sydney

The classification of finite Coxeter groups Aug 2018
Student Algebra Seminar
University of Sydney

Automata for Coxeter Groups Oct 2017
Postgraduate Student Seminar Series
University of Sydney

Service

- Accredited PASS (Peer assisted study session) supervisor
- Referee for Rocky Mountain Journal of Mathematics
- Committee member for Diversity, Equity and Inclusion in the Department of Mathematics & Statistics, UNC Asheville.
- Co-founder and faculty advisor for the Data Science and Machine Learning club, Furman University.
- Committee member for Diversity, Equity and Inclusion in the Department of Mathematics, Furman University.

Technical Skills

Programming Languages: Python, SageMath, Magma, Bash/Shell, R, SQL, LaTeX, HTML, CSS

General Interests/Skills: Undergraduate mathematics and statistics education, cryptology, statistics and machine learning.