Yeeka Yau

Email: yeeka.yau@sydney.edu.au | Phone: 0452 213 877
Nationality: Australian
Personal webpage
Learning Hub (Mathematics)
The University of Sydney, Australia

Employment History

Learning Success Advisor (Mathematics) 2024 - Current
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

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

BSc (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

Educational Leadership & Innovation

Curriculum Design & Innovation

- (2022 - 2023) Led curriculum design efforts at Furman University and UNC Asheville. Integrated innovative teaching techniques, such as interactive in-class simulations and bootstrapping in introductory and second year calculus-based statistics courses.
- (2022 - 2023) Founded and advised the Data Science and Machine Learning Club at Furman University, fostering leadership and interdisciplinary collaboration for students.

Active Learning Strategies

- (Current) Regularly implement active learning techniques such as collaborative problem solving and peer assessment, interactive simulations, and hands-on activities to enhance student engagement in both theoretical and applied courses.

Teaching Experience

- **The University of Sydney (2024 - Current)** :
  - MATH1062ˆ - Mathematics 1B (Calculus & Statistics) 2024
  - DATA1001/1901ˆ - Foundations of Data Science 2024
  - PSYC2012ˆ - Statistics and Research Methods for Psychology 2024
- **UNC Asheville (2023)**:
  - STAT225 - Calculus-based Statistics (second year) Fall 2023
  - MATH167 - Precalculus Fall 2023
- **Furman University (2022 - 2023)**:
  - MTH120 - Introduction to Statistics 2022, 2023
  - MTH150 - Calculus I 2022
  - MTH145 - Calculus for Management, Life and Social Sciences 2023
- **The University of Sydney (2016 - 2020)**:
  - MATH1002 Linear Algebra (1st year) 2020 Summer School
  - MATH1004 Discrete Mathematics (1st year) 2018 Summer School
  - MATH1013ˆ Mathematical Modelling (1st year) 2020
  - MATH1004ˆ Discrete Mathematics (1st year) 2020
  - MATH1014ˆ Intro to Linear Algebra (1st year) 2020
  - MATH1111ˆ Intro to Calculus (1st year) 2019
  - Statistics Bridging courseˆ 2019
  - 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

- * Indicates courses taught as a tutor.
- ˆ Indicates weekly supplementary learning tutorials; duties include creating additional problem sets and solutions, coding tutorials in R, and detailed explanation of theory and tutorial problems.

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

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

Publications and Preprints

Ultra-Low elements and Join Irreducible gates in Coxeter groups 2024
(Y. Yau) pdf
(Preprint)

A pair of Garside shadows 2024
(P. Przytycki and Y. Yau) pdf
(accepted) To appear in *Algebraic Combinatorics*

An artificial neural network approach to finding the key length of the Vigenère cipher. 2023
(C. Millichap, Y. Yau) online version
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) online version
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
National Science Foundation 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
  The 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
  The University of Sydney, Australia
- **Norbert Quirk Prize No. IV** for best essay by an Honours student 2016
  The University of Sydney, Australia
- **The Rolf Adams Prize** for best Pure Mathematics Honours presentation 2016
  The University of Sydney, Australia

Selected Talks

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

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

Coxeter groups and word problems Nov 2023
New Faculty Presentations
UNC Asheville

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

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
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
The University of Adelaide, South Australia

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

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

Automata for Coxeter Groups Oct 2017
Postgraduate Student Seminar Series
The 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, R, SageMath, Magma, Bash/Shell, SQL, LaTeX, HTML, CSS
General Interests/Skills: Tertiary mathematics and statistics education, statistics and machine learning, historical cryptography.