

# Muhammad Afifurrahman

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## RESEARCH INTERESTS Analytic number theory, discrete mathematics and combinatorics.

## EDUCATION

**University of New South Wales**, *PhD in Mathematics*

Sydney, Australia, 09/2022 – 02/2026 (expected)

- Advisors: Alina Ostafe, Igor E. Shparlinski

- Topic: Arithmetic statistics of multivariable Diophantine equations

**Institut Teknologi Bandung**, *M.Si (MSc) in Mathematics*

Bandung, Indonesia, 07/2020 – 10/2021

- Advisors: Aleams Barra

- Thesis: Polynomial parametrization for some classes of maximum Sidon sets over finite fields

**Institut Teknologi Bandung**, *S.Si (BSc) in Mathematics*

Bandung, Indonesia, 07/2016 – 07/2020

- Advisor: Aleams Barra

- Thesis: On the number of different entries in involutory MDS matrices over finite fields of characteristic two

## PUBLICATIONS

7. A. Barra and **M. Afifurrahman**, ‘The total vertex irregularity strength for cubic graphs with a perfect matching’, *Discrete Math.*, **348** 5 (2025), 114402.
6. **M. Afifurrahman** and C. C. Corrigan, ‘Solutions to multiplicative Diophantine equations in orthotopes’, Preprint, 2025, arXiv:2501.15372.
5. **M. Afifurrahman**, ‘A uniform formula on the number of integer matrices with given determinant and height’, Preprint, 2024, arXiv:2407.08191.
4. **M. Afifurrahman**, V. Kuperberg, A. Ostafe and I. E. Shparlinski, ‘Statistics of ranks, determinants and characteristic polynomials of rational matrices’, *Forum Math.*, to appear. arXiv:2401.10086.
3. **M. Afifurrahman**, ‘Some counting questions for matrix products’, *Bull. Aust. Math. Soc.*, **110** 1 (2024), 32-43. arXiv:2306.04885.
2. **M. Afifurrahman** and A. Barra. ‘Determining Sidon polynomials on Sidon sets over finite fields’, *J. Algebra Comb. Discrete Struct. Appl.*, **11** 3 (2024), 175-187. arXiv:2111.08886.
1. **M. Afifurrahman**. ‘On the number of different entries in involutory MDS matrices over finite fields of characteristic two’, *AIP Conference Proceedings* **2423**, 060002 (2021). arXiv:2111.08352.

## RESEARCH TALKS

13. Visiting Talk, Universitas Gadjah Mada, Yogyakarta, Indonesia, February 2025. A uniform formula on the number of integer matrices with given determinant and height.
12. Visiting Talk, Universitas Diponegoro, Semarang, Indonesia, January 2025. Counting rational matrices with bounded height.
11. Visiting Talk, Institut Teknologi Bandung, Bandung, Indonesia, December 2024. Counting rational matrices with bounded height.
10. Joint AustMS-NZMS-AMS Conference, University of Auckland, Auckland, New Zealand, December 2024. A uniform formula on the number of integer matrices with given determinant and height.
9. 7th Australian Mathematical Sciences Students Conference 2024, Western Sydney University, Sydney, Australia, December 2024. Counting rational matrices of bounded height.
8. 12nd Number Theory Down Under Conference, La Trobe University, Bendigo, Australia, September 2024. A uniform formula on the number of integer matrices with given determinant and height.
7. UNSW School of Mathematics & Statistics Postgraduate Conference, UNSW, Sydney, August 2024. Counting rational matrices of bounded height.
6. UNSW Number Theory Seminar, UNSW, Sydney, May 2024. Arithmetic statistics of rational matrices of bounded height. Slides.
5. Combinatorial Number Theory And Connected Topics (CONTACT - III) (online), March 2024. Counting products of integer matrices with bounded height.
4. First Joint IIIMT – Algebra Forum Conference 2023, Universitas Mataram, Mataram, Indonesia (online), December 2023. Arithmetic statistics of rational matrices of bounded height.
3. The 67th Annual Meeting of the Australian Mathematical Society 2023, University of Queensland, Brisbane, Australia, December 2023. Arithmetic statistics of rational matrices of bounded height. Slides.
2. 11th Number Theory Down Under Conference, Australian National University/Mathematical Science Institute, Canberra, Australia, September 2023. Counting products of integer matrices with bounded height. Slides.
1. MathTech 2020, Universiti Sains Malaysia, Penang, Malaysia (online), November 2020. On the number of different entries in involutory MDS matrices over finite fields of characteristic two.

## TEACHING EXPERIENCES

**Class tutor**, *University of New South Wales*

05/2024 – present

- Course: MATH1081 Discrete Mathematics, MATH1231 Mathematics 1B

**Drop-in Centre tutor**, *University of New South Wales*

05/2023 – present

<b>Invigilator and marker</b> , <i>University of New South Wales</i>	12/2022 – present
<b>Freelance mathematics tutor</b>	10/2017 – present
<b>Drop-in Centre tutor</b> , <i>Institut Teknologi Bandung</i>	08/2019 – 05/2021
<b>Invigilator and marker</b> , <i>Institut Teknologi Bandung</i>	10/2018 – 05/2022

### **SELECTED AWARDS**

- Fast Track Program Awardee, Institut Teknologi Bandung, 2020-2021
- First Prize, International Mathematics Competition for University Students, Blagoevgrad, Bulgaria, 2019.
- Gold Medal in Mathematics, Olimpiade Nasional Matematika & Ilmu Pengetahuan Alam [National Olympiad of Mathematics and Natural Sciences], Makassar, Indonesia, 2019.
- Top 11, Indonesia International Mathematical Olympiad Training Camp, Bandung, Indonesia, 2016.
- Gold Medal in Mathematics, Olimpiade Sains Nasional SMA [National Science Olympiad for High Schools], Yogyakarta, Indonesia, 2015.
- Bronze Medal, Asian Pacific Mathematical Olympiad, 2015.

### **SELECTED SCHOLARSHIPS AND GRANTS**

- UNSW Tuition Fee Scholarship + Research Stipend Scholarship, 2022-2026.
- UNSW School of Mathematics and Statistics Top-Up Scholarship, 2022-2026.
- AustMS Student Travel Grant for Joint AustMS-NZMS-AMS Meeting, 2024.
- AustMS Student Travel Grant for Australian Mathematical Sciences Students Conference, 2024.
- UNSW Graduate Research School Development and Research Training Grant, 2024.
- AustMS Student Travel Grant for AustMS Annual Meeting, 2023.
- AMSI Travel Grant for AMSI Summer School, 2023.
- GTA 100 Scholarship Holder, Institut Teknologi Bandung, 2020-2021.

### **OUTREACH ACTIVITIES**

- **Founder and blog writer**, morfID, 2024-present. A mathematical blog in Bahasa Indonesia focusing on mathematics material for second-year undergraduate students and beyond. Presently in charge of basic enumerative combinatorics.
- **Coordinator**, Mathematical Reading Group "Bongkar Meja", 2023-present. Hosting five mathematical paper reading group with Laurence Wijaya (Kentucky), in Bahasa Indonesia. Topics varied from results in additive combinatorics to analytic number theory.
- **Mathematical writer**, Spearhead Circle, 2023-2025. Writing two mathematical zines and two mathematical pop-culture books on calculus and statistics in Bahasa Indonesia.
- **Speaker** on three special sessions in Bahasa Indonesia on studying mathematics graduate studies abroad in Institut Teknologi Bandung, Universitas Diponegoro and Universitas Gadjah Mada, 2024-2025.
- **Committee**, UNSW School of Mathematics & Statistics Postgraduate Conference, 2024.

### **OTHER MATHEMATICAL ACTIVITIES**

- **Head of Mathematics Cluster**, INDERA (Indonesian Network of Doctoral and ECR in Australia), 2024-present.
- **Assistant**, Indonesia International Mathematical Olympiad Training Camp, 2017-present.
- **Participant**, Computational Aspect of Thin Groups, Institute for Mathematical Sciences & National University of Singapore, 2024.
- **Marker**, Simon Marais Mathematics Competition, 2023-2024.
- **Participant**, AMSI Summer School 2023 at University of Melbourne, 2023.
- **Research assistant**, various research projects in Institute Teknologi Bandung, 2019-2022, supervisors including Aleams Barra, Intan Muchtadi-Alamsyah, Pritta Etriwana Putri.
- **Participant**, Research Experience in Mathematics, HSE University, Moscow, Russia (online), 2021, supervised by Ilya V. Vyugin
- **Observer A for Indonesia**, International Mathematical Olympiad, 2021.

### **OTHER ACTIVITIES**

- **Coordinator**, Community of Indonesian PhD Student at UNSW, 2023-2024.
- **Head of Competitions** at MCF HIMATIKA ITB 2019.
- **Head of Media, Communication, and Information Division** at Genshiken ITB, 2018-2019.
- **Co-founder**, Pure Mathematics Society at ITB "Purist MA LOL", 2018.
- **Co-founder**, Competitive Mathematics Society at ITB "Banceng Club", 2018.

### **MEDIA APPEARANCES**

- Guest speaker, RRI Programa 1 Banjarmasin, 2025, link. In Bahasa Indonesia.
- Guest speaker for 9 episodes, Podcast Bebas Linear, 2020–2024, in Bahasa Indonesia.
- Guest of PhD Youtube podcast by Shofia Ishar, 2024, part 1 and part 2. In Bahasa Indonesia.
- Interviewed as an AMSI Grant Awardee for AMSI Summer School 2023.

### **OTHER SKILLS**

**Languages:** Bahasa Indonesia (native), Basa Banjar (native), English.

**Technical Skills:** LaTeX, Python, Photoshop, MATLAB, Microsoft Office, Discord

Last update: January 28, 2025.