Anita Liebenau

✉ School of Mathematics and Statistics • UNSW Sydney • Kensington 2052 • Australia

☎ +61 2 9385 7099

@ a.liebenau@unsw.edu.au

Research interests

Extremal, probabilistic and additive combinatorics, asymptotic enumeration, graph theory, Ramsey theory, positional games

Positions

Since Jan 2024	Associate Professor, School of Mathematics and Statistics, UNSW Sydney
Jul 2020–Dec 2023	Senior Lecturer, School of Mathematics and Statistics, UNSW Sydney
Jul 2018–Jun 2020	Lecturer, School of Mathematics and Statistics, UNSW Sydney
Sep 2015–Jun 2018	Research Fellow, School of Mathematical Sciences, Monash University
Oct 2013–Aug 2015	Research Fellow, Department of Computer Science, University of Warwick

Education

2010–2013	Doctor of Philosophy in Mathematics, Freie Universität Berlin and Berlin Mathematical School, Germany, Dissertation title: "Orientation games and Minimal Ramsey graphs", supervised by Prof. Tibor Szabó.
2013	Visiting research student, Massachusetts Institute of Technology, Cambridge, US, supervised by Prof. Jacob Fox.
2008–2010	Certificate of Advanced Studies in Mathematics, Part II and Part III of the Mathematical Tripos, University of Cambridge, UK, Essay title: "Convergent graph sequences", supervised by Prof. Béla Bollobás.
2006–2010	Mathematics with Computer science, undergraduate studies, Technische Universität Darmstadt, Germany, discontinued in favour of PhD offer.
2004	Early semesters in Mathematics, Technische Universität Kaiserslautern, Germany, correspondence course during High School.

Peer reviewed grant funding

2022–2024	ARC Discovery Project DP220103074, *Enumeration and random generation of contingency tables with given margins,* with Nick Wormald, $322,000AUD.
2018–2022	ARC Discovery Project DP180103684, *Enumeration and properties of large discrete structures,* with Nick Wormald, $408,505AUD.
2017–2020	ARC Discovery Early Career Researcher Award DE170100789, *Advances in graph Ramsey theory,* $340,518AUD.

Prizes, Awards & Honours

2025	Research Professor, Extremal Combinatorics program, Simons Laufer Mathematical Sciences Institute, Berkeley
2020	Early Career Excellence Award, Faculty of Science, UNSW Sydney
2019	Simons Visiting Professor Fellowship, Oberwolfach, Germany
2017	Faculty of Science Award for Excellence in Research by an Early Career Researcher, commendation, Monash University
2010 - 2013	Berlin Mathematical School research scholarship, DFG stipend for the PhD
2008 - 2009	DAAD scholarship, *European Excellence Program,* covering tuition and living costs for exchange year in Cambridge

Preprints

[1] D. Altman, A. Liebenau, On the uncommonness of minimal rank-2 systems of linear equations, arXiv:2404.18908.

[2] P. Allen, J. Böttcher, A. Liebenau, Universality for graphs of bounded degeneracy, arXiv:2309.05468.

To appear

[3] J. Balogh, A. Liebenau, L. Mattos, N. Morrison, On multicolor Turán numbers, accepted in *SIAM J. Discrete Math* (29 May 2024), arXiv:2402.05060.

Published

[4] N. Kamčev, A. Liebenau, N. Morrison, On uncommon systems of equations, *Isr. J. Math* (2024), https://doi.org/10.1007/s11856-024-2649-2.

[5] A. Liebenau, N. Wormald, Asymptotic enumeration of graphs by degree sequence, and the degree sequence of a random graph, *J. Eur. Math. Soc.* (2024), 26, 1–40.

[6] N. Kamčev, A. Liebenau, N. Morrison , Towards a characterisation of Sidorenko systems, *The Quarterly Journal of Mathematics* (2023), 74(3), 957–974.

[7] A. Liebenau, N. Wormald, Asymptotic enumeration of digraphs and bipartite graphs by degree sequence, *Random Struct. Algorithms* (2023), 62(2), 259–286.

[8] A. Bishnoi, S. Boyadzhiyska, D. Clemens, P. Gupta, T. Lesgourgues, A. Liebenau, On the minimum degree of minimal Ramsey graphs for cliques versus cycles, *SIAM J. Discrete Math* (2023), 37(1), 25–50.

[9] A. Liebenau, L. Mattos, W. Mendonça, J. Skokan, Asymmetric Ramsey properties of random graphs for cliques and cycles, *Random Struct. Algorithms* (2022), 1–21.

[10] N. Kamčev, A. Liebenau, N. Wormald, Asymptotic enumeration of hypergraphs by degree sequence, *Advances in Combinatorics* (2022), 1, 36pp.

[11] A. Liebenau, R. Nenadov, The threshold bias of the clique-factor game, *J. Combin. Theory Ser. B* (2022), 152, 221–247.

[12] N. Kamčev, A. Liebenau, D.R. Wood, L. Yepremyan, The size Ramsey number of graphs with bounded treewidth, *SIAM J. Discrete Math* (2021), 35(1), 281–293.

[13] C. Bodkin, A. Liebenau, I.M. Wanless, Most binary matrices have no small defining set, *Discrete Mathematics* (2020), 343(10), 112035.

[14] A. Liebenau, Y. Pehova, An approximate version of Jackson's conjecture, *Combin. Probab. Comput.* (2020), 29(6), 886–899.

[15] D. Clemens, A. Liebenau, D. Reding, On minimal Ramsey graphs and Ramsey equivalence in multiple colours, *Combin. Probab. Comput.* (2020), 29(4), 537–554.

[16] A. Liebenau, M. Pilipczuk, P. Seymour, S. Spirkl, Caterpillars in Erdős-Hajnal, *J. Combin. Theory Ser. B* (2019), 136, 33–43.

[17] K. Choromanski, D. Falik, A. Liebenau, V. Patel, M. Pilipczuk, Excluding hooks and their complements, *Electron. J. Combin.* (2018), 25(3), #P3.27.

[18] T.F. Bloom, A. Liebenau, Ramsey equivalence of K_n and $K_n + K_{n+1}$, *Electron. J. Combin.* (2018), 25 (3), #P3.4.

[19] F. Kardoš, D. Král', L. Mach, A. Liebenau, First order convergence of matroids, *European J. Combin.* (2017), 59, 150–168.

[20] D. Clemens, A. Liebenau, A non-trivial upper bound on the threshold bias of the Oriented-cycle game, *J. Combin. Theory Ser. B* (2017), 122, 21–54.

[21] J. Fox, A. Grinshpun, A. Liebenau, Y. Person, T. Szabó, On the minimum degree of minimal Ramsey graphs for multiple colours, *J. Combin. Theory Ser. B* (2016), 120, 64–82.

[22] D. Clemens, H. Gebauer, A. Liebenau, The random graph intuition for the tournament game, *Combin. Probab. Comput.* (2016), 25, 76–88.

[23] D. Clemens, A. Ferber, R. Glebov, D. Hefetz, A. Liebenau, Building spanning trees quickly in Maker-Breaker games, *SIAM J. Discrete Math, 29(3)* (2015), 1683–1705.

[24] R. Glebov, A. Liebenau, T. Szabó, On the Concentration of the Domination Number of the Random Graph, *SIAM J. Discrete Math* (2015), 29(3), 1186–1206.

[25] J. Fox, A. Grinshpun, A. Liebenau, Y. Person, T. Szabó, What is Ramsey-equivalent to a clique? *J. Combin. Theory Ser. B* (2014), 109, 120–133.

[26] D. Clemens, A. Ferber, M. Krivelevich, A. Liebenau, Fast Strategies In Maker–Breaker Games Played on Random Boards, *Combin. Probab. Comput.* (2012), 21, 897–915.

Book chapter

[27] F. Ebert, A. Liebenau, *Arvin, Berit und die Lastwagen.* In Besser als Mathe (2010), Vieweg+Teubner, 151-160.

Conference proceedings

[28] N. Kamčev, A. Liebenau, N. Morrison, Uncommon Systems of Equations, in Extended Abstracts EuroComb 2021, Birkhäuser, Cham (2021), 611–616.

[29] A. Liebenau, L. Mattos, W. Mendonça, J. Skokan, Asymmetric Ramsey properties of random graphs involving cliques and cycles, in *Acta Mathematica Universitatis Comenianae* (2019), 88 (3), 917–922.

[30] I. Bárány, K. Buchin, M. Hoffmann, A. Liebenau, An Improved Bound for Orthogeodesic Point Set Embeddings of Trees, in *EuroCG2016: 32nd European Workshop on Computational Geometry* (2016), March 30-April 1, 2016: Book of Abstracts, 47–50.

[31] D. Clemens, A. Liebenau, A non-trivial upper bound on the threshold bias of the Oriented-cycle game, in *The Seventh European Conference on Combinatorics, Graph Theory and Applications* (2013), 16, 359-363.

[32] D. Clemens, A. Ferber, R. Glebov, D. Hefetz, A. Liebenau, Building spanning trees quickly in Maker-Breaker games, in *The Seventh European Conference on Combinatorics, Graph Theory and Applications* (2013), 16, 365-370.

SELECTED TALKS

Sep 2023	1st Brazilian School of Combinatorics, invited talk, Juquehy, Sao Paulo, Brazil
Aug 2022	International Conference on Random Structures and Algorithms, **Plenary lecture**, Gniezno, Poland
Apr 2022	Oberwolfach, Combinatorics, Probability and Computing, Germany
Jul 2021	British Combinatorial Conference Durham, invited mini-symposium talk (online)
Sep 2020	8th Polish Combinatorial Conference, **Plenary lecture** (online)
Sep 2019	Banff, Probabilistic and Extremal Combinatorics, Canada
Jun 2019	Dagstuhl, Graph Colouring, Germany
Jan 2019	Oberwolfach, Graph Theory, Germany
Dec 2018	41ACCMCC Australasian Conference on Combinatorial Mathematics and Combinatorial Computing, **Plenary lecture**, Rotorua, NZ
July 2018	ICM 2018 satellite conference Combinatorics: Extremal, Probabilistic and Additive, Sao Paolo, Brazil
Dec 2017	DIMAP 10 Year Anniversary workshop, Warwick, UK
Mar 2017	Bellairs Institute, Graph Theory Workshop, Barbados
May 2015	Two One-Day Colloquia in Combinatorics, Queen Mary University London, UK, only invited talks
Mar 2015	Joint Free University of Berlin – Tel Aviv University Workshop on Positional Games and Extremal Combinatorics, Tel Aviv University, Israel
Jul 2014	ICMS, Extremal combinatorics, invited talk, Edinburgh, UK
Jun 2014	SIAM Conference on Discrete Mathematics, invited mini-symposium talk, Minneapolis, US
Jun 2014	Clay Institute, Extremal and probabilistic combinatorics, invited talk, Oxford, UK

CONFERENCE AND SEMINAR TALKS

Jun 2024	Combinatorics in Christchurch, invited speaker, University of Canterbury
Jun 2024	Discrete Mathematics Seminar, Monash University
Dec 2023	44ACC Australasian Conference of Combinatorics, Perth

Oct 2023	CMSA Seminar (online)
Jun 2023	Number Theory seminar, UNSW Sydney
Dec 2021	43ACC Australasian Conference of Combinatorics, Melbourne (online)
Dec 2020	Seminar in Combinatorics, University of Illinois Urbana-Champaign, USA (online)
Dec 2020	Combinatorics Seminar, Tel Aviv University, Israel (online)
Jul 2020	Positional games reading group, McGill University, Canada (online)
Mar 2020	Probability seminar, UC Irvine, USA (all local expenses paid)
Jul 2019	Colloquium Facets of Discrete Structures; and Combinatorics research seminar, Free University Berlin, Germany (all local expenses paid)
Jun 2019	Discrete Mathematics seminar, Oxford University, UK (all local expenses paid)
Jun 2019	Discrete Algorithms seminar, Warsaw University, Poland (all local expenses paid)
Jan 2019	Mittagsseminar Discrete Mathematics & Algorithms, ETH, Switzerland
Jan 2019	Combinatorics seminar, Tel Aviv University, Israel (all local expenses paid)
Feb 2018	Graphs and Randomness workshop, IMPA, Rio de Janeiro, Brazil
Sep 2017	WIMSIG Conference 2017, Adelaide, Australia
Aug 2017	Random Structures & Algorithms Conference, Gniezno, Poland
Apr 2017	Discrete Structures and Algorithms seminar, University of Melbourne, Australia
Dec 2016	40th ACCMCC Newcastle, Australia
Jul 2016	Combinatorics seminar, Technical University Hamburg, Germany
Jul 2016	7th European Congress of Mathematics, Berlin, Germany
Jul 2016	Combinatorics seminar, Free University Berlin, Germany
Jul 2016	Analysis seminar, Potsdam, Germany
May 2016	Discrete Mathematics seminar, Monash University, Melbourne, Australia
Dec 2015	39th ACCMCC Brisbane, Australia
Sep 2015	Discrete Mathematics seminar, Monash University, Melbourne, Australia
Jul 2015	Novi Sad Workshop on Foundations of Computer Science, Novi Sad, Serbia
Jul 2015	Workshop on Graph Coloring, Haifa, Israel
Jul 2015	British Combinatorial Conference, University of Warwick, UK
Feb 2015	Discrete Lunch, Tartu, Estonia
Feb 2015	Combinatorics seminar, University of Warwick, UK
Nov 2014	Combinatorics seminar, Bristol, UK
May 2014	Combinatorics seminar, University of Warwick, UK
Mar 2014	Mittagsseminar, ETH Zurich, Switzerland
Feb 2014	Combinatorics seminar, Birmingham, UK
Dec 2013	Bertinoro Workshop on Algorithms and Graphs, Bertinoro, Italy
Oct 2013	Lunchtime seminars, LSE, UK
Sep 2013	EuroComb, Pisa, Italy
Jun 2013	Young Women in Discrete Mathematics meeting, Bonn, Germany
Mar 2013	Combinatorics seminar, MIT, US
Mar 2013	Combinatorics seminar, Tel Aviv University, Israel
Nov 2012	Kolkom, Berlin, Germany
Nov 2012	Berlin-Poznan Seminar, Berlin, Germany
Jun 2012	Combinatorics Seminar, Universitat Politècnica de Catalunya, Barcelona
Jun 2012	Combinatorial Algorithms Day, ETH Zürich
Jan 2012	MDS Monday Colloquium, Berlin, Germany
Dec 2010	"What is...?" talk at Berlin Mathematical School, Berlin, Germany

ORGANISATION AND SERVICE

2025	MATRIX The mathematics of McKay and Wormald, conference co-organiser (with Pu Gao, Catherine Greenhill, Misha Isaev and Ian Wanless)
2025	SLMath Connections Workshop: Extremal Combinatorics, co-organiser (with Julia Böttcher and Maya Stein)
2023	MATRIX Extremal Problems in Graphs, Designs, and Geometries, conference co-organiser (with Daniel Horsley and Tibor Szabó)
Since 2022	Deputy Chair of the Frontiers in Fundamental Mathematics Nexus at UNSW Sydney

Since 2018	Combinatorics seminar UNSW, organiser
2022	Combinatorics special session organiser, AustMS conference (with Catherine Greenhill)
2020–2022	Chair of Sustainability Committee, School of Mathematics and Statistics, UNSW Sydney
2020–2022	Science Sustainability Working Group member, Faculty of Science, UNSW Sydney
2021	Round the World Relay in Combinatorics, local organiser
2020–2022	Combinatorial Mathematics Society of Australasia (CMSA) Online Seminar series, creator and main organiser
2018–2021	CMSA Council member
Dec 2020	CMSA Day, co-organiser (with Catherine Greenhill)
Dec 2019	42ACCMCC, UNSW Sydney, organising committee (chair: Catherine Greenhill)
2020	Guest editor, proceedings of MATRIX workshop Structural Graph Theory
Nov 2019	MATRIX Structural Graph Theory, conference co-organiser (with David Wood and Alex Scott)
2019	Girls do the Maths workshop, main organiser, UNSW Sydney
2017–2018	ECR Representative, Faculty of Science, Monash University
Apr 2017	"Women of Mathematics" exhibition and Colloquium by Cheryl Praeger, main organiser, Monash University
2016–2017	ECR Representative, School of Mathematics, Monash University
Jun 2016	Probabilistic and Extremal Combinatorics Downunder, co-organiser (with Nick Wormald and David Wood), Monash University
Jul 2014	Open-problems workshop, chair of organising committee, QMUL-Warwick alliance, Cotswolds, UK
Sep 2012	Discrete Workshop Brandenburg, organiser, Wilhelmsaue, Germany
Sep 2011	Discrete Workshop Brandenburg, organiser, Wilhelmsaue, Germany
Jun 2008	Ball of Mathematics, chair of organising committee, Darmstadt, Germany

Referee for Combinatorica, Discrete Mathematics, Electronic Journal of Combinatorics, Israel Journal of Mathematics, Journal of Combinatorial Theory, Series B, Journal of Graph theory, Random Structures and Algorithms, SIAM Journal on Discrete Mathematics, Transactions of the AMS, and others.

Teaching experience

UNSW Sydney, Australia

Higher Several Variable Calculus (coordinator, lecturer, tutor), Term 1 2021, 2022, 2023 & 2024
Discrete mathematics (tutor) T1, T3 2021, T1 2023
Combinatorics (coordinator, lecturer, tutor) T3 2020 & 2022
Algebra and Calculus (lecturer, tutor) T3 2020, T3 2021, T1, T3 2022, T3 2023

Monash University, Australia

Network Mathematics (lecturer, with David Wood), Semester 2 2017
Algebra & Number theory (tutor), Semester 1 2016

University of Warwick, UK

Supervision of 3$^{\text{rd}}$-year project on positional games, 2014/15
Algorithmic Graph Theory (lecturer, with Justin Ward), Semester 2 2013/14
Advanced Graph Theory (tutor), Semester 1 2013/14

Institute for Advanced Study, Princeton, US

Teaching assistant for Graph Theory (lecturer: Penny Haxell), May 2013

Freie Universität Berlin, Germany

Supervision of Diploma thesis of Huashin Yao on Size Ramsey numbers, Oct 2011-Aug 2012
Supervision of three student seminar talks on Ramsey theory, Semester 1 2010/11
The probabilistic method (tutor), Semester 1 2010/11

Technische Universität Darmstadt, Germany

Linear Algebra I (tutor), Semester 1 2007/08

Volunteering

2015–2017	Embrace Education (non-profit, university student-run organisation), tutor for refugee high school student, Melbourne
2009–2011	BOOKBRIDGE, Head of book acquisition in UK and Head of Construction for three libraries in rural Mongolia

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Languages

German (mother tongue), English (fluent), French and Italian (intermediate), Spanish (beginner).