# David Kurniadi Angdinata

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## Research interests

I currently work in the arithmetic of abelian varieties over global fields, specifically on the special values of their twisted L-functions in the context of the refined Birch and Swinnerton-Dyer conjecture. I am involved in the formalisation of arithmetic geometry in interactive theorem provers, being a pioneer in the development of the theory of elliptic curves in Lean. I am also interested in understanding local-global obstructions to rational points on varieties, via cohomological gadgets such as the Brauer group. Finally, I am passionate in pedagogical aspects of undergraduate mathematics education.

Refer to my website for a full list of projects, talks, conferences, teaching, and notes.

## Education record

9/21 – 9/25 PhD Mathematics — *London School of Geometry and Number Theory*
Supervised by Vladimir Dokchitser and Kevin Buzzard

10/20 – 6/21 MASt Pure Mathematics — *University of Cambridge*

10/16 – 6/20 MEng Pure Mathematics and Computational Logic — *Imperial College London*

1/14 – 12/15 Singapore-Cambridge GCE A-level — *Temasek Junior College*

1/12 – 12/13 Singapore-Cambridge GCE O-level — *Anderson Secondary School*

## Employment record

7/22 – 9/22 Research assistant at Huawei Technologies R&D UK Ltd
Summer internship on formalisation of modern mathematics in automated theorem proving

6/19 – 9/19 Cryptography engineer at Adjoint UK Ltd
Developed three highly polymorphic libraries for zero-knowledge proof protocols in Haskell:
- `galois-field` — an efficient implementation of finite field arithmetic
- `elliptic-curve` — an extensible database of elliptic curve operations
- `pairing` — a polymorphic library for bilinear pairing algorithms

Published on Hackage as: `hackage.haskell.org/package/<name>`

## Research projects

?/24 Formalising division polynomials, elliptic divisibility sequences, the torsion subgroup, and the Tate module of Weierstrass elliptic curves (joint with Peiran Wu and Junyan Xu)
Preprint in preparation

10/24 Algebraicity of Artin–Hasse–Weil L-series over global function fields
Preprint

1/24 L-values of elliptic curves twisted by cubic characters
Preprint submitted to the *Journal of the London Mathematical Society*

7/23 An elementary formal proof of the group law on Weierstrass elliptic curves in any characteristic (joint with Junyan Xu)
Published in the *14th International Conference on Interactive Theorem Proving*

## Selected talks

5/9/24 Twisted elliptic L-values over global fields
Contributed talk for *Algebraic Number Theory* in Munich

31/7/24 Denominators of BSD quotients
Contributed talk for *Young Researchers in Algebraic Number Theory* in Oxford

26/6/24 Elliptic curves in mathlib
Workshop talk for *Formalising Algebraic Geometry* in Pasadena (Online)

19/6/24 Twisted L-values of elliptic curves
Contributed talk for *75th British Mathematical Colloquium* in Manchester

24/4/24 L-values of elliptic curves twisted by cubic characters
Seminar talk for *Linfoot Number Theory Seminars* in Bristol

25/8/23 Twisted elliptic L-values
Contributed talk for *Early Number Theory Researchers Workshop 2023* in Bielefeld

2/8/23 An elementary formal proof of the group law on Weierstrass elliptic curves in any characteristic
Conference talk for *14th International Conference on Interactive Theorem Proving* in Białystok

24/8/22 Formalisation of elliptic curves in Lean
Contributed talk for *Young Researchers in Algebraic Number Theory* in Glasgow

26/5/22 Elliptic curves and the Mordell–Weil theorem
Seminar talk for *London Learning Lean* in London

25/4/22 Elliptic curves in Lean
Workshop talk for *Huawei Technologies R&D UK Ltd* in Cambridge

4/12/20 Rank heuristics for elliptic curves
Seminar talk for *Part III Seminar Series* in Cambridge

13/9/19 Pairing-based elliptic curve cryptography
Presentation for *Adjoint UK Ltd* in London

## Selected conferences

2–6/9/24 Algebraic Number Theory *Munich*

31/7–2/8/24 Young Researchers in Algebraic Number Theory *Oxford*

22–25/7/24 International Congress on Mathematical Software (co-organiser) *Durham*

24–28/6/24 Formalising Algebraic Geometry *Pasadena (Online)*

31/7–4/8/23 14th International Conference on Interactive Theorem Proving *Białystok*

## Selected teaching

5/24 – 6/24 Supervisions for *Year 1 Term 3 research projects* *UCL*
Projects on how to tell if a number is prime and group theory and Rubik's cube

1/24 – 3/24 Laboratory for *MATH60040 Formalising Mathematics* *ICL*

1/24 – 3/24 Problem classes and marking for *MATH0034 Number Theory* *UCL*

1/24 – 3/24 Tutorials for *6CCM351A Representation Theory of Finite Groups* *KCL*

7/23 Assistant for *Year 12 Maths Summer School: Logic and Proof* *UCL*
Assisted in an introductory course on logic and proof for sixth form students that spanned 5 days

5/23 – 6/23 Supervisions for *Year 1 Term 3 research projects* *UCL*
Projects on cryptography, sums of squares, and the axiom of choice

3/23 Teacher for *London Maths Outreach* *Harris Academy St John's Wood*
Designed a introductory course on elliptic curves for sixth form students that spanned 4 weeks

1/23 – 3/23 Tutorials and marking for *5CCM251A Discrete Mathematics* *KCL*

10/22 – 12/22 Marking for *MATH0022 Galois Theory* *UCL*

10/22 – 12/22 Tutorials and marking for *5CCM224A Introduction to Number Theory* *KCL*

5/22 – 6/22 Supervisions for *Year 1 Term 3 research projects* *UCL*
Projects on continued fractions, cryptography, and Lean

10/21 – 12/21 Tutorials and marking for *MATH0014 Further Linear Algebra* *UCL*

## Awards attained

2024 MAPS Faculty Education Award 2024 for individual excellence *UCL*

2021 – 2025 Full funding for 4-year PhD research [EP/S021590/1] *EPSRC*

2020 Governors' MSci JMC Prize for best overall performance in final year *ICL*

2020 Donald Davies Prize for best final year individual project *ICL*

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| 2020 | Faculty of Engineering Dean's List | *ICL* |
| 2018 | Department of Mathematics UROP research studentship | *ICL* |
| 2018 | Faculty of Engineering Dean's List | *ICL* |
| 2017 | G Research Ltd Prize for academic excellence | *ICL* |
| 2017 | Faculty of Engineering Dean's List | *ICL* |
| 2012 – 2015 | Full 4-year school-based scholarship | *MOE Singapore* |

## Language skills

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| Languages | English, Mandarin/Hokkien, Indonesian/Malay, Japanese |
| Programming | Lean, Haskell, Python/SageMath, Magma, Java, C/C++, Prolog, PHP/MySQL |
| Tools | LaTeX, XHTML/CSS, Git, Stack, Vim |

## Miscellaneous activities

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| 2022 – 2023 | Private tutor for mathematics and computer science in TutorChase and ElitePrep |
| 2020 – 2021 | Owner and moderator of the Cambridge Part III Mathematics Discord server |
| 2018 – 2021 | Live-TeXed lecture notes for geometry, algebra, and number theory available on GitHub |
| 2019 – 2020 | Problems curator for the Imperial College Mathematics Competition |
| 2018 – 2020 | Organiser for the Imperial College undergraduate mathematics colloquium |
| 2012 – 2018 | Solved 180 Project Euler problems primarily in Java and Haskell |