Abdul Musthakin

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Education

University of Warwick — Coventry, England
MMath Mathematics, First Year — *Sep. 2026 – Jun. 2030*

Cardiff Sixth Form College — Cardiff, Wales
*A-levels: Mathematics, Further Mathematics, Physics, Chemistry – A*A*A*A** — *Sep. 2024 – Jun. 2026*

- 880/880 UMS at AS; 2149/2200 UMS overall

Cathays High School, Cardiff – GCSEs: 10 A*; Welsh Baccalaureate: A* — Sep. 2019 – Jun. 2024

Independent Study & Mathematical Writing

Probability & Statistics: Casella & Berger, *Statistical Inference*, in progress
Differential Geometry: Wrote *A Motivational Introduction to Differential Forms*, a 57-page exposition covering tangent and cotangent spaces, differential forms, integration and the exterior derivative; further study of de Rham cohomology via Lee's *Introduction to Smooth Manifolds* (Ch. 1–17)
Algebraic Topology: Hatcher's *Algebraic Topology* (Ch. 0–2); included homological-algebra results in 83-page exhaustive expository paper on differential forms
Analysis: Expository notes on the Mellin transform and the Dirichlet integral

Projects

Classical Mechanics Simulations | *Python, SymPy, SciPy, NumPy, Matplotlib* — Oct. 2022 – Sep. 2023

- Derived equations of motion symbolically from the Lagrangian with SymPy for the double pendulum, elastic pendulum and Atwood machine
- Integrated the resulting ODE systems, and the gravitational two-body problem, numerically with SciPy's `solve_ivp`
- Checked solutions against conservation of energy; visualised phase-space trajectories and animated the motion

Activities

Mathematics Society, Vice-President | *Cardiff Sixth Form College* — Sep. 2024 – Jun. 2026

- Elected Vice-President in Year 13; organised weekly sessions for around 15 students
- Delivered around 30 talks to peers on topics including discrete calculus and Faulhaber's formula, introductory real analysis, group theory and exact sequences

Advanced Mathematics Seminar | *Cardiff Sixth Form College* — Mar. 2025 – Apr. 2026

- Selected for a small group of four working with a teacher on mathematics beyond the A-level syllabus
- Worked through HN Shapiro's second proof of Dirichlet's theorem on primes in arithmetic progressions via Dirichlet characters and L-functions

Volunteering

GCSE Mathematics Mentoring | *Cardiff Sixth Form College* — Nov. 2024 – Feb. 2025

- Mentored two GCSE students over a 10-week programme, breaking exam topics down into clear, logical steps

Open Day Assistance | *Cardiff Sixth Form College* — 2024 – 2025

- Demonstrated experiments and explained course content to prospective students and families across four open days

Skills & Interests

Programming: Python (4+ years: NumPy, SciPy, SymPy, Pandas, Matplotlib); C++ (basic); SQL (basic)
Tools: Git, LaTeX