

Tushar Muralidharan

Curriculum Vitae

Education

- 2021–2024 **Bachelor of Philosophy (Honours) - Science**, *The Australian National University*,
Specialized in Mathematics.
Supervisor: Assoc. Prof. Adam Piggott
- 2020 **Dual Enrolment**, *Princeton University*.
Completed COS 226 – Algorithms and Data Structures
- 2016–2020 **High School Diploma**, *Montgomery High School*, GPA – 4.0 W.

Experience

Vocational

- 2023 **Chess Coach**, Canberra Academy of Chess.
Taught Chess classes for primary and secondary school children, arbitrated school tournaments and resolved competitive disputes.
- 2022 **Teaching Assistant**, The Australian National University.
Taught workshops and marked assignments and exams for Foundations of Computing (COMP1600) and Logic (COMP2620), ensuring fair grading practices.
- 2019 **Developer Intern**, PHARMVISTA, East Hanover.
Developed a series of webpages for marketing a line of organic melatonin supplements, managed web hosting services, liaised with various team members for documentation.

Detailed achievements:

- Published website for Melat-8® supplements
- Worked on website spam-prevention measures including CAPTCHA
- Restructured website organization system in WebHost Manager and cPanel
- Recovered from unexpected data breach

Miscellaneous

- 2019–2020 **Programmer**, FIRST ROBOTICS TEAM 1403, Cougar Robotics.
Designed computer vision system for our FIRST World Championship robot, cooperated with other sub-teams, managed sub-team of 5 new students, worked with strict competition format and deadlines. Allowed me to exhibit analytical skills and teamwork.
- 2019–2020 **Treasurer**, *Computer Science Club*, Montgomery High School.
Taught workshops in Java and Python, led team-building activities to foster a welcoming community, managed club activities and schedules, worked with outreach to find speakers and partners.
- 2016 **Technology Support Volunteer**, *Wayne Public Library*.
Provided one-on-one technology help to elderly individuals in the community. Helped to solve problems with mobile devices, laptops, and watches, and aided with dexterity problems.

Projects

- Apr 2022 **Overleaf Dark Mode.**
A Chrome extension with over 3,000 users and a 5-star rating that provides a dark mode for the online LaTeX editor Overleaf.
- Feb 2022 **Wordle AI.**
An AI for the daily word game Wordle. The AI can guess the WORDLE in an average of 3.42 turns, which was shown to be theoretically optimal.
- Jan 2022 **ANU Timetable.**
A web app that tells users the time of their next ANU lecture or tutorial and allows them to create shareable links, Google Maps directions, and take notes.
- Oct 2021 **ChessMemory.**
A blindfold Chess puzzle trainer inspired by Human Benchmark's Visual Memory Test, that uses Chess puzzles from the lichess.org puzzle database. The website is featured on the lichess.org open database [website](#).
- Jan 2021 **BetterGenesis.**
A web app that lets users view their grades in an enhanced, more-informative dashboard with grade calculators and trend tracking. The backend consists of an Express web server with industry standard AES-256 encryption, and the frontend is made in Vue.js with Vuetify.

Papers

- Oct 2023 **Quadratic Reciprocity via Quadratic and Cyclotomic Fields**, *Algebraic Number Theory – ASC*.
Supervisor: Dr. Angus McAndrew
- Jun 2023 **Elementary proofs of Gauss' triangular number theorem and a partition identity of Ramanujan**, *Analytic Number Theory – ASC*.
Supervisor: Dr. Angus McAndrew
- Feb 2023 **Exploring Projective Algebraic Geometry, Ideals, Varieties, and Algorithms – ASC**.
Supervisor: Dr. Angus McAndrew
- Oct 2022 **Representation Theory of the Finite Group $GL_2(\mathbb{F}_p)$** , *Groups, Rings, and Linear Algebra – ASE*.
Supervisor: Dr. Angus McAndrew
- May 2022 **Chaotic Motion in a Double Pendulum System and Convective Transport in Phase Space**, *Applied Mathematics I – ASE*.
Supervisor: Dr. Hooman Hezaveh

Talks

- May 2024 **Cayley Graphs and Semi-Direct Products**, *Practice Talk – Honours*.
Supervisor: Assoc. Prof. Adam Piggott
- Jun 2023 **Quadratic Reciprocity via Quadratic and Cyclotomic Fields**, *Algebraic Number Theory – ASC*.
Supervisor: Dr. Angus McAndrew

Jun 2023 **Partitions**, *Analytic Number Theory – ASC*.
Collaborators: Lekh Bhatia, Adrian Lo
Supervisor: Dr. Angus McAndrew

Awards

- 2023 Helpful Member in Official Mathematics Discord
- 2022 First Place in ANU Chess Club Blitz Tournament
- 2021 Fourth Place in ASD-ANU Co-Lab Capture the Flag Competition
- 2020 National AP Scholar
- 2019 AP Scholar with Distinction
- 2019 National Merit Scholarship Commended Student
- 2018 Best Website – Junior Achievement of New Jersey Hackathon
- 2016 Top 500 Rubik's Cube Average in Australia – World Cube Association
- 2016 Presidential Academic/High Achievers Award
- 2016 Outstanding Academic Achievement

Computer Skills

- Advanced \LaTeX , NODE.JS, JAVA, JAVASCRIPT, HTML, CSS
- Intermediate PYTHON, C++, SageMath, macOS, Microsoft Windows, Word, Excel, Adobe Photoshop
- Basic C, C#

Communication Skills

- 2018 Oral Presentation at the FBLA State Leadership Conference
- 2018 Hosted the MontyHacks Hackathon as Staff
- 2018 Taught at the Annual Kids' Tech Night at Montgomery High School

Languages

- English **First Language**
- Tamil **Basic** *Basic words and phrases only*
- Spanish **Basic** *Basic words and phrases only*

Interests

- Chess
- Memory Training
- Speedcubing
- Puzzles