**Arko Chakrabartiroy**

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# Education

* **Stuyvesant High School**, New York, NY (Graduation June 2026)
* **Cumulative Unweighted Average**: 91% | **SAT**: 1590 | **PSAT** **10**: 1520 | **PSAT/NMSQT**: 1500 | **AIME** Qualifier (2025)
* **AP**: Precalculus (5), Computer Science A (5), World History (5), Biology (4) | Senior Year AP - Calculus BC, Statistics, Physics 1
* **Regents**: Algebra II (98), Chemistry (98), Physics (92), Geometry (94), Spanish LOTE (96), Living Environment (95), ELA (89), Global History & Geography II (89)
* **Honors**: National Merit Semifinalist, College Board National Recognition Awardee, AP Scholar with Honor, National Society of High School Scholars (NSHSS) Invited member

# Research Papers & Publications

**Feature-Optimized Machine Learning for Early Identification of College Dropout**

* Mentor: M. Sarmadi (MIT Ph.D.) | Preprints.org (100+ downloads in 24 hrs)
* Leveraging seven grid search optimized machine learning models and a comprehensive dataset of undergraduate students, this paper identifies the optimum machine learning model for predicting college dropout and identifies the key predictors of dropout risk.
* Built an app for student/administrator use to assess dropout probability, harnessing/utilizing the paper’s findings
* Resubmission invited (and resubmitted) to *National High School Journal of Science* (*NHSJS)*, 2025
* Presented at the *Symposium of Rising Scholars*

**Development of a Large Language Model-Based System for Enhanced Access to Chess for Visually Impaired Individuals**

* Mentors: M. Sarmadi (MIT Ph.D.), C. Ellison (Cornell B.S.) | Research Archive of Rising Scholars
* Leveraging machine learning model advancements, such as LLMs, speech-to-text and chess AI models, this paper develops a computerized system that enables the visually impaired to play chess.
* Built and launched an app enabling visually impaired players to play chess

# Academic Programs & Research Experience

**Columbia Engineering SHAPE — Math in Action: Operations Research for Social Good (Summer 2025)**

* Dean’s Fellowship; applied optimization, simulation, and data analysis to healthcare, education, and city planning
* Collaboratively designed and implemented a gerrymandering research project leveraging math tools
* Presented the project at the 2025 SHAPE Symposium at Columbia University
* Gained hands-on experience translating abstract mathematical methods into practical solutions for social good

**Johns Hopkins University — Engineering Innovation Pre-College Program (Summer 2025)**

* Explored civil, chemical, electrical/computer, mechanical, and materials engineering
* Built a spaghetti bridge, engineered a bioreactor, and prototyped an electronic device
* Collaborated with an international team to present a final engineering design solution

**NYU Courant Institute of Mathematical Sciences — Math Circle (Summer 2023)**

* Advanced-level coursework in mathematical problem solving and contest preparation

**Medgar Evers College Research Foundation — SYEP (Summer 2023)**

* Led obesity health-tech project; built website & formal team presentation

**NYC Urban Debate League** **— Summer Debate Institute (Summer 2023)**

* Led team and participated in public forum debate on current policy matters

**Medgar Evers College Research Foundation — SYEP (Summer 2022)**

* Led and collaborated with a team of peers; Conceived Undersound, a platform for underrepresented composers; produced technical design, site, and presentation

**New York Math Circle (Summer 2022)**

* Contest math & problem solving (Algebra, Geometry, Graphing)

# Leadership, Tutoring & Service

**Founder & Lead Tutor — Pro Bono SHSAT Online Platform (2024–Present)**

* Built Discord-based tutoring community offering free SHSAT prep
* Designed curriculum, Kahoots, slides, and practice exams; led group & 1:1 sessions

**Senior Tutor — Schoolhouse.world (2024–Present)**

* Tutored SAT Math/Reading bootcamp, plus Algebra II, Geometry, Trigonometry, and Precalculus
* Ranked top 10% in tutoring hours and top 20% in sessions hosted
* Invited by College Board to serve as peer tutor in national SAT bootcamp

**Teaching Assistant — Yang Taekwondo (2024–Present)**

* Taught fundamentals to students ages 6–12; led warm-ups, drills, patterns, sparring
* Modeled perseverance, leadership, accountability, and teamwork

**Junior Advisory Board Member — The Gift of Chess (2025–Present)**

* Distributed chess sets globally to underserved communities
* Organized free tournaments to expand access and build community engagement

# Creative Work, Skills & Interests

**STEM**

* **Programming**: Java, Python, HTML, CSS, JavaScript | Replit, VS Code | Advent of Code| Coded clicker games, sequence simulations, personal websites

**Arts & Creative Work**

* **Piano Performance**
* 1st Place, *Crescendo International Piano Competition* (among 6,500+ applicants in age group 16-24), 2024-2025
* Carnegie Hall recital, 2025
* 92nd Street Y, 2023, 2024
* **Violin Performance**
* Manhattan School of Music recital
* **Music (Composition)**
* NY Philharmonic Young Composers Bridge Program
* Music composition performed by NY Philharmonic musicians
* Independent portfolio
* **Chess**
* Captain, Stuyvesant U1800 Blitz Team — 1st Place SuperNationals 2025
* 3rd Place NY State U1800 Scholastic (2025)
* 18 Trophies (6 First place, 8 Second place, 4 Third place)
* USCF 1821 | FIDE 1850
* **Creative Writing**
* Self-published fiction, fantasy, and poetry on personal site

**Athletics**

* **Taekwondo**: Second-Degree Black Belt; Teaching Assistant at Yang Taekwondo
* **Swimming**: Lifeguard and Swim Coach (All City Aquatics)

# Personal Attributes

• **Leadership**: Guided peers as chess captain, tutor, and Taekwondo instructor

• **Mentorship:** Supported growth of younger students in SAT prep, SHSAT prep, math, chess, and martial arts

• **Creativity**: Applied advanced mathematical and programming tools to develop apps and author research papers tackling real-world societal challenges; also expressed creativity through original music composition, live performance, and writing

• **Resilience & Discipline**: Proven through years of martial arts, competition, and academic rigor

• **Collaboration**: Thrived in research, engineering projects, and team competitions

• **Intellectual Curiosity**: Pursues unanswered questions beyond coursework—e.g., designing a Collatz-style sequence—and channels that curiosity into applied research (dropout prediction app; fair redistricting algorithms).

• **Service‑Driven Empathy**: Steps in to support people and peers—guiding a stranded traveler through airline rebooking, assisting elderly neighbor by carrying gallon water bottles up 19 flights of stairs during an extended power and water outage, mentoring students via Schoolhouse.world and a pro bono SHSAT platform, frequently created quizlets and kahoots for peers and underclassmen in math, science, Spanish, and expanding access through The Gift of Chess.

• **Adaptability**: Balanced academics, athletics, arts, and leadership with flexibility and focus