



# STEM Unleashed 2023

A high school STEM genius program for Summer 2023

**Participants:** The brightest and most motivated STEM-oriented high school students in the Cincinnati Tri-State region.

**Program:** Great minds are challenged through calculus-based, first-principles derivation and coding of advanced engineering concepts and algorithms. Topics range from classical regression (design matrix, linear/nonlinear), physics (3D trajectory of spinning balls), thermodynamics (entropy, Gibbs energy, phase equilibria), process dynamics ([PID-control](#)), machine learning ([CART](#)), to the latest artificial intelligence architectures ([Transformer](#)). Unlike design-oriented engineering summer camps, this program inspires and excites through its unabashed detailed treatment of the underlying mathematics and algorithms. Like climbing, the thrill is in the effort. But with no tests or grades, it is totally safe and rekindles students' fearless passion towards learning.

**Unleash STEM Skills:** No Ti-84 constraint. Students learn key elements of the Python scientific and machine learning ecosystem, e.g., [Numpy](#), [Scipy](#), [Plotly](#), [Pandas](#), [PyTorch](#), [Jax](#). These highly valued computational skills are also the key to optimal design strategies achieved with minimum experimentation, time, and cost.



**STEM OutLoud:** Young geniuses tend to be introverts because their ideas lay beyond their ability to communicate. Communication skills are front and center during 3-hour Saturday meetings at UC. Students are coached on oral presentation skills like PhD engineering students, and assigned to groups for weekly presentation competitions.

**Character:** Like sports, this program's unbounded intellectual challenges and group presentation competitions build grit, confidence, teamwork, and leadership skills.

**Schedule:** Starting 06 June 2023, online Tues & Thurs (8 to 10 PM), in-person Sat (2 to 5 PM) at UC Main Campus for 7 weeks.

**Benefits:** Professional and personal growth, socialize with like-minded gifted peers, a diploma, and a commensurate letter of reference for students completing all requirements (including a >15 minute technical YouTube video: [example](#)). Financially, career-wise, and perhaps more important than which college a student attends, is getting hired as a well-remunerated coop engineer after the first year of college. UC is ranked #4 nationwide and #1 among public universities for coop and internships. We recognize that the technical and communication skills employers and research laboratories seek are distinct from those sought by university admission officers.

**Competitive Admission:** Minimum Math PSAT or SAT of 740 or Math ACT of 34. Personal statement and evidence of extraordinary mathematical ability. Send application including picture of PSAT/SAT/ACT score and a couple of paragraphs expressing why they should be in the program and how they can benefit to: [chemeng@uc.edu](mailto:chemeng@uc.edu)

**Informational Meeting:** [Super-Saturday](#) is hosting the next informational meeting with the UC engineering professor teaching this program on 25 March at 9:45 AM and 12:45 PM DePaul Cristo Rey High School, 3440 Central Parkway Cincinnati OH, 45225.

