

COMPUTATIONAL STEM LAB

We are a team of STEM researchers at the University of Chicago led by PhD student Lauren Blake, postdoctoral scholar Daniel Rice, and faculty mentor John Novembre.

MISSION

The growing importance of computer programming to science has outpaced its limited role in the standard high school curriculum. This discrepancy contributes to inequity and underrepresentation in college science classes and beyond. To help close the gap, we run programming workshops that connect local high school students with practicing scientists and use examples from biomedical research. We seek to inspire students to learn to program and to imagine careers in STEM fields.

WORKSHOPS

We run workshops that combine programming lessons with short meet-a-scientist talks by local researchers. The workshops are modular: the lessons and talks can be rearranged depending on the availability of time and volunteers. They are also portable and can be run either on the University campus or in a high school classroom.

We have run three pilot workshops, reaching a total of 48 high school and incoming college students, nearly all from underrepresented groups in the sciences. In exit surveys, 94% of our students have reported wanting to continue to learn to program after the workshop. In free-response questions, students report that the workshop made programming seem fun and doable and that they enjoyed meeting scientists.

Winter 2019	Spring 2019	Summer 2019
12 Indiana HS students	10 CPS HS students	26 incoming U of C students
Hosted at UChicago	Visiting Rauner College Prep	Hosted at UChicago
2 3-hr weekend sessions	3 2-hr after-school sessions	1 2-hour session
2 scientist talks/day	1 scientist talk/day	1 scientist talk

CURRICULUM

PROGRAMMING LESSONS

Our modules motivate students with real data and research problems. For example, we introduce data-analysis by having students analyze data on the heart rate of astronauts during spaceflight. In our simulation lesson, students model triage policies in a disaster. We have developed teaching materials that are:

Accessible—We teach interactive python programming in Jupyter Notebooks. This makes it easy to get started without having to learn about text editors, shell commands, etc.

Flexible—We use myBinder.org to host the notebooks remotely. This allows students to work on any computer with an internet connection.

Shareable—Our lessons and code are available for free on GitHub.

MEET-A-SCIENTIST TALKS

Interspersed with the programming lessons, the instructors and invited guests give 15-minute presentations on their work and career paths. We focus on connecting the programming lessons with real-world research and on showing students the steps to becoming a scientist. During these sessions, we encourage questions and conversation.