Center for Educational Outreach





Center for Educational Outreach











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About Us

The Center for Educational Outreach strives for all students to have access to science, technology, engineering, and math (STEM). We believe STEM education is meaningful for the student, valuable to society, and important for the future.

Vision

Our vision is to increase the number of underrepresented youth pursuing STEM careers.

Mission

Our mission is to engage JHU faculty, staff, and students to inspire and prepare PK-12 students in STEM education and careers.

Principles for Community Engagement

These principles for community engagement, informed by consultations with communityengaged colleagues and community leaders, guide the university's collective work in equitably and authentically engaging in community-campus partnerships:

- Shared visions and values
- Mutuality and respect
- Transparency and communication
- Shared decision-making
- Commitment

Goals



Engage PK-12 Students in Baltimore City in High-Quality STEM Programming

We strive to design, host, and support hands-on programs and projects that provide opportunities for PK-12 students to explore STEM inside and outside of the classroom.



Engage JHU Faculty, Staff, and Students in Community Centered STEM Outreach & Partnerships

We strive to create pathways for the JHU community to share their passions and research with the next generation of STEM professionals.



4

Provide Resources and Professional Learning Opportunities for PK-12 STEM Educators

We create access points for educators to stay abreast of research based pedagogy and leverage resources to make STEM learning more accessible in their classrooms.

2023 - 2024 COMMUNITY IMPACT

OUR MISSION & VISION The Center for Educational Outreach strives for all students to have a love of

science, technology, engineering, and

math, or STEM. We engage JHU faculty,

staff and students in STEM outreach and

programming that addresses the

STEM outreach.

opportunity gap in Baltimore City and engages our local community in quality



Center for Educational Outreach

PK-12 STUDENT IMPACT

Image: Non-Baltimore city students Non-Baltimore city students



VOLUNTEERS &

EMPLOYEES ENGAGED

K - 5 STUDENTS

REACHED THROUGH

SABES CURRICULUM

33,689



VOLUNTEER HOURS

We engage JHU faculty, staff, and students, as well as community volunteers, in a variety of STEM programming. Together, we provide quality STEM learning opportunities to PK-12 students through events like the Hopkins Robotics Cup, Maryland Science Olympiad tournaments and more!



TEACHERS & CURRICULUM

Our SABES curriculum is the K-5 science curriculum for Baltimore City Public Schools (City Schools) and reaches students in school. We also support teachers through our longterm programs, professional development opportunities, and through resource support like providing STEM material kits.







\$144,123.00 VOLUNTEER ECONOMIC IMPACT



259 TEACHERS ENGAGED

About Our Community

We aim to leverage resources and create bridges for students often underrepresented or excluded from opportunities to explore and excel in STEM education. The communities we serve are full of students who are eager to learn and flourish when provided access to opportunities and tools to succeed in STEM.

In particular, our office focuses our efforts on engaging and impacting students and families in the greater Baltimore City community. Many of our long-term programs directly serve students from the Baltimore City Public Schools district while some one-day events have a broader reach to include students across Maryland.

2023 - 2024 BALTIMORE CITY PUBLIC SCHOOLS STUDENT DEMOGRAPHICS



* Baltimore City Public Schools provides free breakfast and lunch to all students and does not collect applications for free or reduced lunch. This percentage is calculated based on which students are homeless, in foster care, or participating in low-income family resources like Temporary Assistance for Needy Families (TANF) or Supplemental Nutrition Assistance (SNAP). Medicaid participation is excluded.

SOURCE: Baltimore City Public Schools - <u>https://www.baltimorecityschools.org/district-overview</u>; Maryland State Department of Educationhttps://reportcard.msde.maryland.gov/Graphs/#/Demographics/Enrollment/3/14/6/30/XXXX/2023

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Where We Serve

Baltimore City Program Sites



Baltimore City Schools Had Students Engage in Program & Event Offerings

SOURCE: Baltimore Neighborhood Indicators Alliance Map Gallery - https://bniajfi.org/mapgallery/

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OUR PROGRAMS



WHITING INTERNSHIPS IN SCIENCE & ENGINEERING (WISE):

WISE is a paid research opportunity for Baltimore City high school students who are mentored by Johns Hopkins University (JHU) researchers. WISE aims to increase the access of students pursuing STEM in college by developing their knowledge of a specific STEM field and fostering connections with STEM professionals.

BALTIMORE ONLINE ALGEBRA FOR STUDENTS IN TECHNOLOGY (BOAST):

The Baltimore Online Algebra for Students in Technology (BOAST) Program is a free, after-school program and research project for high school students who are interested in STEM fields and careers and want to apply their math skills to solving real-world challenges.

CHARM CITY STEM LEAGUE (CCSL):

CCSL is a STEM mentoring program that pairs over 60 JHU undergraduate student volunteer mentors with Baltimore City based Science Olympiad teams. Mentors engage over 300 K-12 students through weekly, hands-on after school sessions at over 15 school sites & support students and coaches at local tournaments.



GRADES:

11 - 12

GRADES:

GRADES:

3 - 12

- 12

STEM ACHIEVEMENT IN BALTIMORE ELEMENTARY SCHOOLS (SABES):

The SABES after-school program uses curriculum, independent STEM projects and STEM mentor visits to engage students in grades 3-5 at community sites. Students also complete Student Driven Projects to create solutions to address areas of improvement in their local community.

SCHOO

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Partnership Sites







Math Tutorial Program Site

STEM School Partnership

SABES After-school Sites

BOAST Program

Baltimore Design School Baltimore Leadership School for Young Women Digital Harbor High School Green Street Academy Mergenthaler (Mervo) High School Patterson High School Vivien T. Thomas Medical Arts Academy Western High School

WISE Program

Academy for College and Career Exploration Baltimore City College Baltimore Polytechnic Institute Garrison Forest School Green Street Academy P-Tech at Dunbar High School Western High School

Charm City STEM League (CCSL) Program

B

8

- Baltimore City College Baltimore Collegiate School for Boys Baltimore International Academy East Baltimore Polytechnic Institute Barclay EMS Bard High School Early College Baltimore Bluford Drew Jemison STEM Academy Cherry Hill EMS Digital Harbor High School Dr. Nathan A. Pitts-Ashburton EMS Edmondson-Westside High School Fallstaff EMS Federal Hill Preparatory School Fort Worthington EMS
- Green Street Academy Hampstead Hill Academy Hazelwood EMS Lakeland EMS Lillie May Carroll Jackson Charter School Maree G. Farring EMS Mergenthaler Vocational Technical HS Patterson Park Public Charter School Roland Park EMS Southwest Baltimore Charter School Stadium School Thomas Jefferson EMS Western High School Westport Academy

Math Acceleration Tutoring with Hopkins Program

Launched in Fall 2023, the Henderson-Hopkins Math Tutorial Program is worked to address pandemic learning loss for Baltimore City Public School students in mathematics. The program pairs paid Hopkins graduate and undergraduate student tutors with Henderson-Hopkins students to provide small group, personalized tutoring, during the school day to 4th - 8th graders performing below grade level. Students receive tutoring support twice a week for 16 weeks. Our program seeks to increase participating students' self-efficacy, abilities, attitudes, and confidence in mathematics.

During the second year, the program provided mathematics support to 163 Henderson-Hopkins students and employed more than 101 JHU student tutors from 3 JHU school divisions. At the ending of the second year, the program had a name change from Henderson-Hopkins Math Tutorial Program to MATH Program (Math Acceleration Tutoring with Hopkins).



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Barclay Hopkins STEM Partnership

This 10-year STEM partnership began in 2015 as part of the Homewood Community Partners Initiative. The partnership engages students and families at Barclay Elementary Middle School, a public PK-8 school located near the JHU Homewood Campus. It leverages resources of JHU's Whiting School of Engineering to engage the Barclay School community in enhanced STEM experiences as part of a quality science program. We provide a variety of STEM enrichment programs and events throughout the year.

Working with faculty, staff and students from JHU, the partnership runs curriculum-aligned campus visits, field trips, and school-day and after-school day STEM enrichment programs. We also host special events posing STEM challenges to Barclay families, such as Family Engineering Day in November, and our annual Science and Engineering Expo in the Spring.



Pictured above, Barclay 7th grade students explored robotics and haptics technology applications within Professor Jeremy Brown's lab. Graduate students presented current research projects and had students try out prototype prosthetic models in the Laboratory for Computational Sensing and Robotics. Associate Teaching Professor Steve Marra's students led a challenge to build a simple electric motor from scratch.



Whiting Internships in Science and Engineering

The Whiting Internships in Science and Engineering (WISE) program is a paid research learning opportunity for Baltimore City public high school students who are mentored by Johns Hopkins University (JHU) researchers. This year, WISE was offered after school in the fall and spring or daily over four consecutive weeks in the summer. Each student explores a subject in laboratory, computer, or field settings. At the close of each program, WISE students present their research and experiences to fellow WISE students, their research labs, their families, and Hopkins community members. WISE started at Garrison Forest School, a private school for girls in Baltimore County. The Center for Educational Outreach continues to support their program administratively.

	CITY SCHOOLS STUDENTS	FACULTY MENTORS	GRADUATE STUDENT MENTORS	GARRISON Forest	FACULTY MENTORS	GRADUATE STUDENT MENTORS
Summer 2023	6	4	5	-	-	-
Fall 2023	-	-	-	9	9	9
Spring 2024	13	8	13	5	5	5



"[The] WISE experience confirmed that I can learn hard things." - **WISE Alumni**

"I get to mentor, communicate, and learn from another inquiring mind. Sometimes, I feel that I am challenged to think broader and deeper." -WISE Mentor

Baltimore Online Algebra for Students in Technology Program











The Baltimore Online Algebra for Students in Technology (BOAST) Program is a free, hybrid after-school program and research study for 9th-11th grade students with a burgeoning interest in STEM fields who want to apply their algebra skills to solve real-world challenges.

The objective of this program is to make possibilities for any student who aims at becoming an engineer to have a toolbox of skills, mathematical experience, and self-efficacy to achieve that dream.





"Yes – those who did it, absolutely. For example, this program has created a curious mind in [one student]."

- ALGEBRA II TEACHER



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Charm City STEM League

Charm City STEM League (CCSL) is a JHU undergraduate-led program that envisions a future where every student can excel in STEM careers and form beneficial relationships with mentors. This year, 64 JHU undergraduate mentors engaged 319 Baltimore City students in active learning and scientific inquiry through Science Olympiad, a national STEM competition.

CCSL mentors led 278 weekly STEM-focused mentoring sessions at 23 partner school sites, serving 25 teams of students in grades 3-12. Mentors also created online curriculum resources and over 230 material kits which were distributed to 30 partner schools. Mentors also supported 4 coach clinics and served as tournament test writers and volunteers at local regional and state tournaments.

With support from a generous grant from the Abell Foundation, CCSL hosted multiple on-campus events, including a new high school campus visit and an invitational tournament in February which engaged 226 students from 15 middle schools in Maryland, Virginia, and Washington D.C. CCSL also expanded its annual "Build It, Study It" event in November, where middle school students engaged in hands-on workshops building balsa towers, paper rollercoasters, wind turbines and wheeled vehicles.



35 CITY SCHOOL TEACHERS/COACHES



"I was able to be exposed to and take science seriously for the first time in my life, and teach myself new things."

9TH GRADE EVENT PARTICIPANT

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STEM Achievement in Baltimore Elementary Schools

STEM Achievement in Baltimore Elementary Schools (SABES) began as a National Science Foundation (NSF)-funded collaboration between JHU and City Schools seeking to improve STEM curriculum and instructional delivery in grades 3 – 5. It focused on community engagement in nine schools within three specific neighborhoods: Greater Homewood, Greektown/Highlandtown and Park Heights. SABES continues to operate beyond initial grant-funding to date in an independent partnership with City Schools and local after school programs. With additional funding from the Maryland State Department of Education (MSDE), the writing team was able to expand the curriculum to include grades K-5.

SABES IN SCHOOL CURRICULUM

The SABES curriculum allows students to problem solve real-world challenges. Each unit is written around a phenomenon-driven question and story line. Students complete an Engineering and Design Challenge where they define the problem, develop possible solutions, and then optimize the best solution. The K-5 SABES curriculum is undergoing revisions and will be comprised of 30 units and 714 lessons.

All lessons are written, reviewed, and updated to align with Next Generation Science Standards (NGSS), Common Core Literacy Standards, and researchedbased instructional practices. Each unit developed contains a 100+ page teacher guide, student resources, presentations, and student assessments. All elementary teachers in Baltimore City Public Schools have access to use the turnkey SABES curriculum for science instruction.

SABES AFTER-SCHOOL

SABES curriculum consists of units from the Engineering Adventures (EA) curriculum in addition to independent STEM projects. Throughout the school year, students complete engaging, inquiry-based STEM projects. Partway through the year, classes break away from the structured curriculum to work on Student Driven Projects, during which students identify an area for improvement in their local community and use STEM in order to address it. In 2023-2024, we offered two program sites at the Village Learning Place in Charles Village as well as Patterson Park Charter School.







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ONE-DAY EVENTS

In addition to running several long-term programs year round, our office also coordinates, hosts, and sponsors a variety of one-day or short-term events to promote STEM. These programs run anywhere from 2-12 hours in length and provide more pathways for us to engage the community in STEM enrichment. Check out a selection of this year's one-day events below:

HOPKINS ROBOTICS CUP

Saturday, January 27, 2024 and February 10, 2024 - Location: City Schools Professional Development Center

157 elementary school, 208 middle school and 80 high school students from Baltimore City competed in this VEX IQ and VEX VRC Championship tournaments hosted by our office in partnership with City Schools. Over 64 JHU and community members served over 550 volunteer hours as judges at the events and awarded top teams with awards. Funding for this event was provided by our long-term sponsor, Northrup Grumman.

BARCLAY SCIENCE AND ENGINEERING EXPO

Thursday, April 18, 2024 - Location: Barclay Elementary/Middle School

50 Barclay students and 30 family members engaged in hands-on engineering activities and an egg drop challenge led by Clark Scholars and volunteers! Teachers also displayed posters featuring highlights of their STEM activities from the year. In total, 39 JHU volunteers served 43 volunteer hours at the event.







TOWER OF POWER

Wednesday, February 21, 2024 - Location: Virtual/Homewood Campus

Thirteen Maryland middle schools participated in a virtual spaghetti and marshmallow building challenge. The Summit School took first place with a tower measuring 59 inches. The top 5 teams advanced to compete in-person at the Homewood campus event and Our Lady of Mount Carmel School took first place!

MARYLAND SCIENCE OLYMPIAD STATE TOURANMENT Saturday, April 13, 2024 - Homewood Campus

Maryland Science Olympiad

We hosted the annual State Tournament where 682 students from the top 47 middle and high school teams from across Maryland competed in over 40 different STEM topic events and engineering design challenges. Over 75 volunteers from JHU and the community served over 530 volunteer hours to run the event. Baltimore City had 13 teams qualify for the event, including 12 teams supported by JHU mentors from Charm City Science League.



In the News

Check out how our programs were captured this past year!



MIDDLE SCHOOLERS TEST SKILLS AT HOPKINS-HOSTED MARYLAND SCIENCE OLYMPIAD INVITATIONAL

February 15, 2024 - JHU HUB

Several hundred students, coaches, and mentors visited the Homewood campus February 10th, 2024 for a day filled with science-related contests. <u>https://hub.jhu.edu/2022/08/15/henderson-hopkins-math-tutoring-program/</u>



Awards and Honors

Recognizing Exemplary Outreach and Community Service

IRINI J. MAROULIS AWARD

This award was established by Maria Maroulis Cunningham (WSE '97, MME '01) to honor the memory of her mother, Irini J. Maroulis, and her dedication to community service and outreach. Each year, an outstanding female engineering student is recognized with the honor and this year's awardee was Chemical Engineering and Mathematics undergraduate student Lavanya Gupta.













Meet Our Team

Our team is comprised of former informal and formal K-12 educators, engineers, and champions for STEM education. We are passionate about using our unique skills and experiences to deepen our impact and serve as changemakers in the STEM education ecosystem in Baltimore City and beyond.



Alisha Sparks Executive Director



Margaret Hart STEM Outreach Advisor

FULL TIME STAFF:



Adrienne Bantum Budget Analyst



Katie James MATH Program Administrator



Kahea Chai MATH Site Coordinator



Alexis Daniels Baltimore OST Program Administrator



Amanda Valledor STEM Outreach Program Administrator



John Van Beckum Barclay Program Administrator

PART-TIME STAFF:



Artelia Davis Compliance and Operations Program Administrator



Nicole Pulliam Sr. Administrative Coordinator



Dr. Jaracus Copes SABES Instructional Coach



Alli Reigel BOAST Content Developer and Instructional Coach

Nantambu Kohlbatz - BOAST Hybrid Instructor Tyair Manning - BOAST Hybrid Instructor Emily Henkes Callahan - SABES Instructional Coach

Partners and Sponsors

We could not do our work without the vital support of our current and former community partners and sponsors.

Thank you to all of our supporters and champions!













Student Affairs Center for Social Concern





Acknowledgements

Photo Credits: Will Kirk, Phil Laubner, Liz Bonilla, Greg Stansbury, Hartlove-Goodyear **Program Map Illustration:** Amanda Valledor

We also thank our wonderful volunteers, faculty, staff, students, and JHU campus partners who make our programs and events possible!



Center for Educational Outreach

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