Engaging Hispanic Students in STEM through Project-Based Learning

Presenters:

Dr. Moise Koffi, Mathematics Professor & Proyecto Access STEP/CSTEP Director

Mrs. Diandra Jugmohan, Proyecto Access STEP/CSTEP Co-Director

Mrs. Briseida Cortez-Rodriguez, Proyecto Access CSTEP Coordinator

HACU Hispanic Association of Colleges & Universities

33rd Annual Conference
Championing Hispanic Higher Education Success: "Meeting the Challenge of Prosperity and Equality"
Chicago, IL
October 8th, 2019

Hostos Community College

New York State STEP Science & Technology Entry Program
preparing science, technology & licensed professionals since 1986

Presentation Outline

- Institutional background
- Program overview
- Best practices: Project-based learning (PBL)
- Program outcomes
- Activity

Institutional background

Eugenio Maria de Hostos Community College

The City University of New York

- Established in the South Bronx, NY in 1968
- 28 Associate Degree programs
- 2 certificate programs

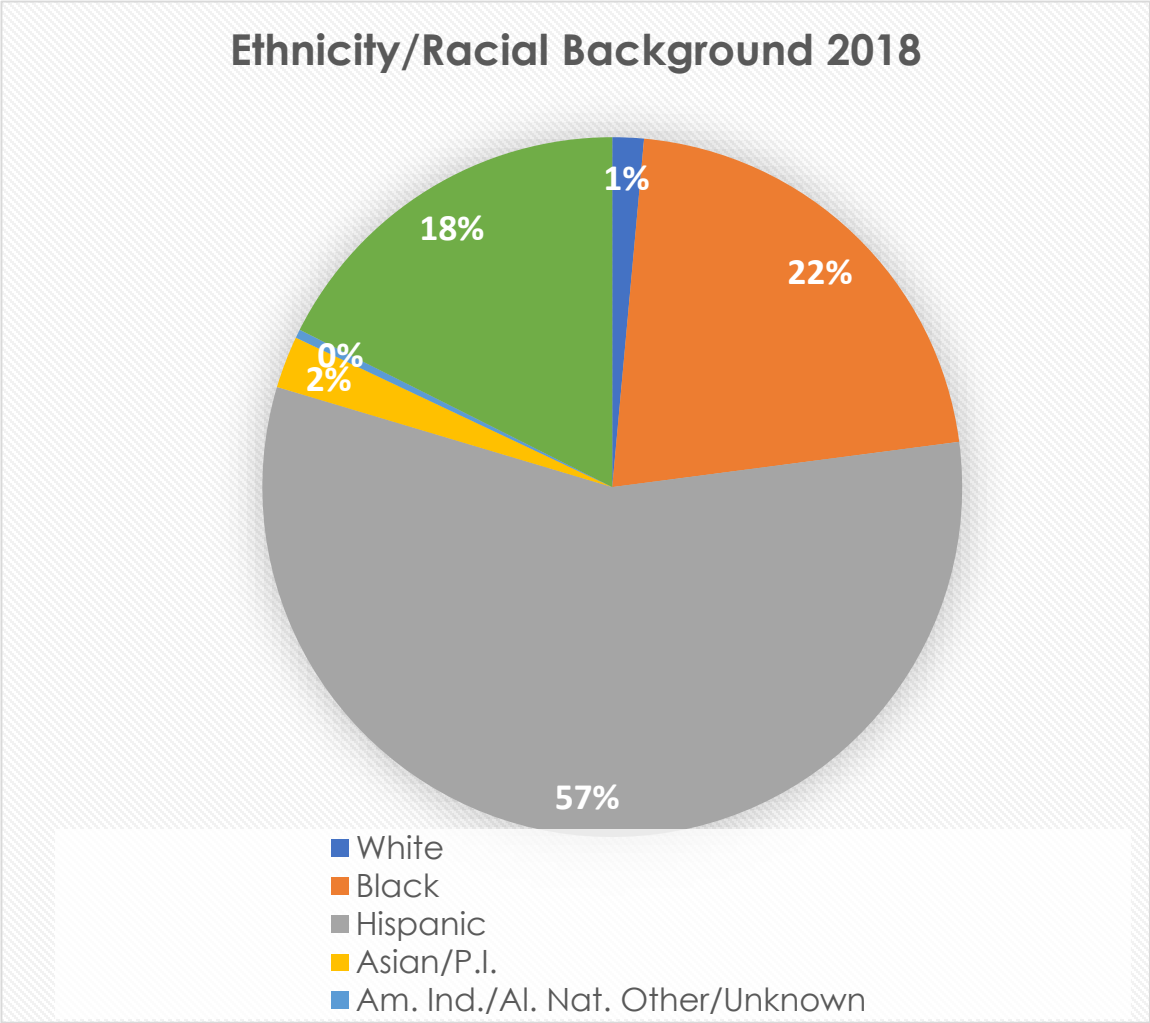
CUNY The City University of New York

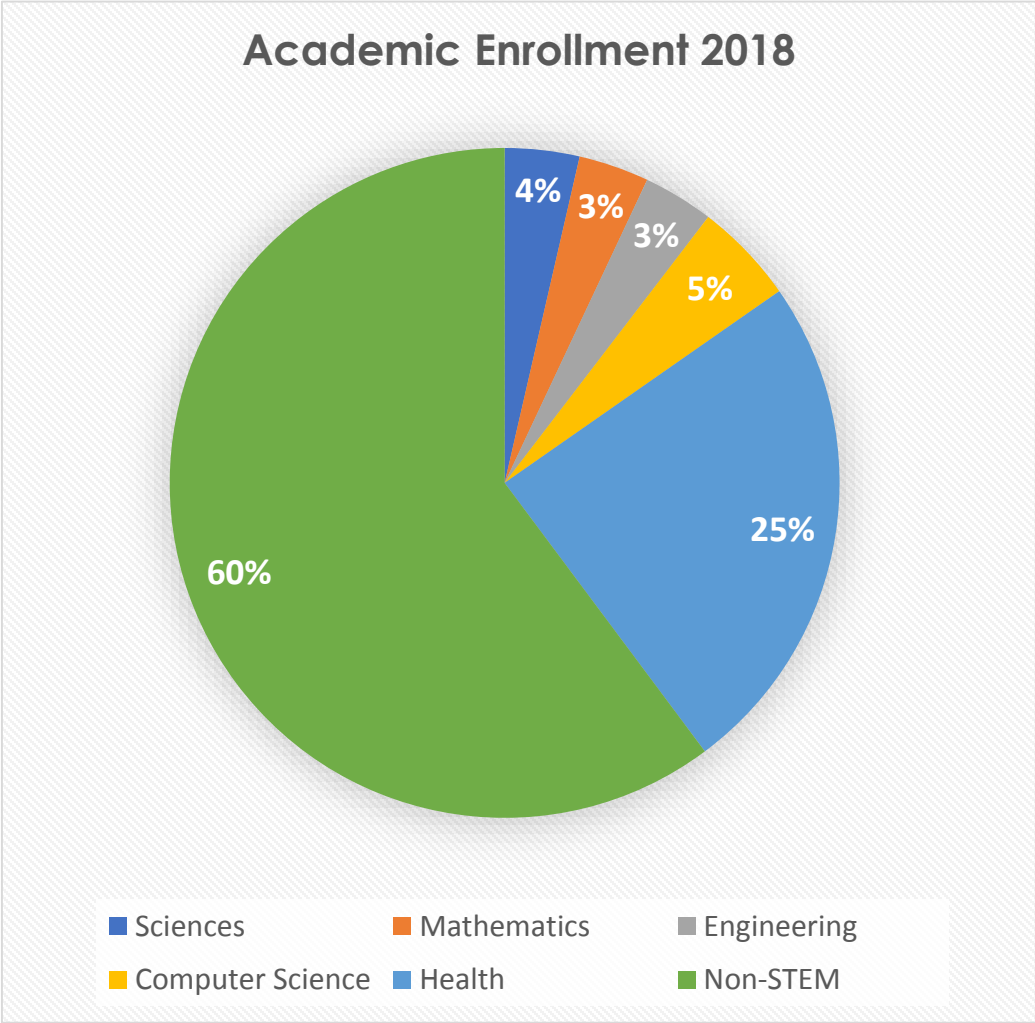
Institution Mission

Hostos offers access to higher education leading to **intellectual growth** and **socio-economic mobility** through the development of linguistic, mathematical, technological, and critical thinking proficiencies needed for **lifelong learning and for success** in a variety of programs including careers, liberal arts, transfer, and those professional programs leading to licensure.

Institution Demographics

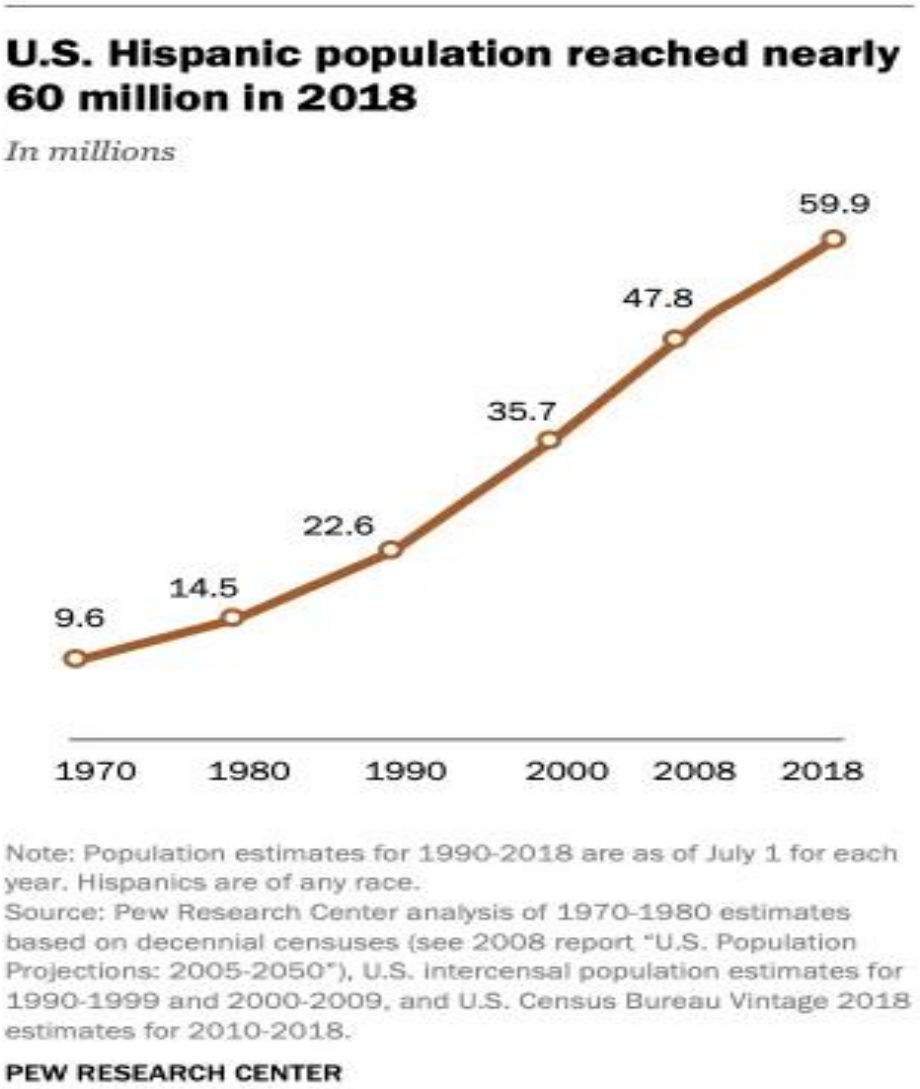
Enrollment: 7,340 Female: 67.1% Male: 32.9%

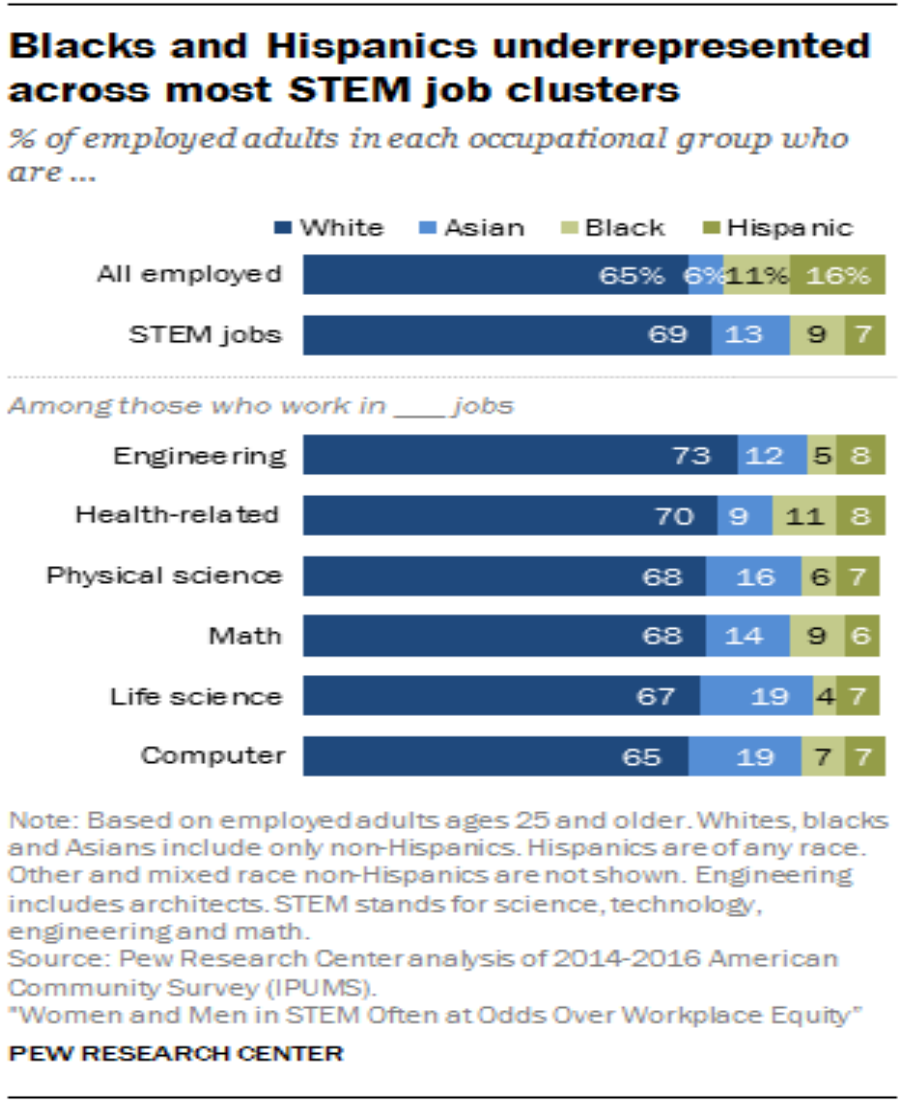




Sourcehttp://www.hostos.cuny.edu/Hostos/media/Office-of-the-President/Institutional-Research-Assessment/rptHostosStudentProfile_20190703.pdf/

STEM Workforce in the United States





Source: https://www.pewresearch.org/fact-tank/2018/01/09/7-facts-about-the-stem-workforce/

Proyecto Access/STEP Background

Implemented at Hostos Community College since 1997, as a replication of the nationally well-known San Antonio Pre-Freshman Engineering Program (PREP).

The program funded by NASA and developed by The Hispanic Association for Colleges and Universities (HACU) to increase the number of minority graduates in the STEM disciplines from colleges and universities.

After a decline in funding in 2005, The New York State Education Department The Science and Technology Entry Program (STEP) increases the number of historically underrepresented and *economically disadvantaged students pursuing careers leading to professional licensure or professions in mathematics, science, technology and health-related fields.

PREFRESHMAN ENGINEERING PROGRAM PREP FOUNDED 1979 → HACU HISPANIC ASSOCIATION OF COLLEGES & UNIVERSITIES ↔ NASA → NEW YORK STATE STEP SCIENCE & TECHNOLOGY ENTRY PROGRAM preparing science, technology & licensed professionals since 1986

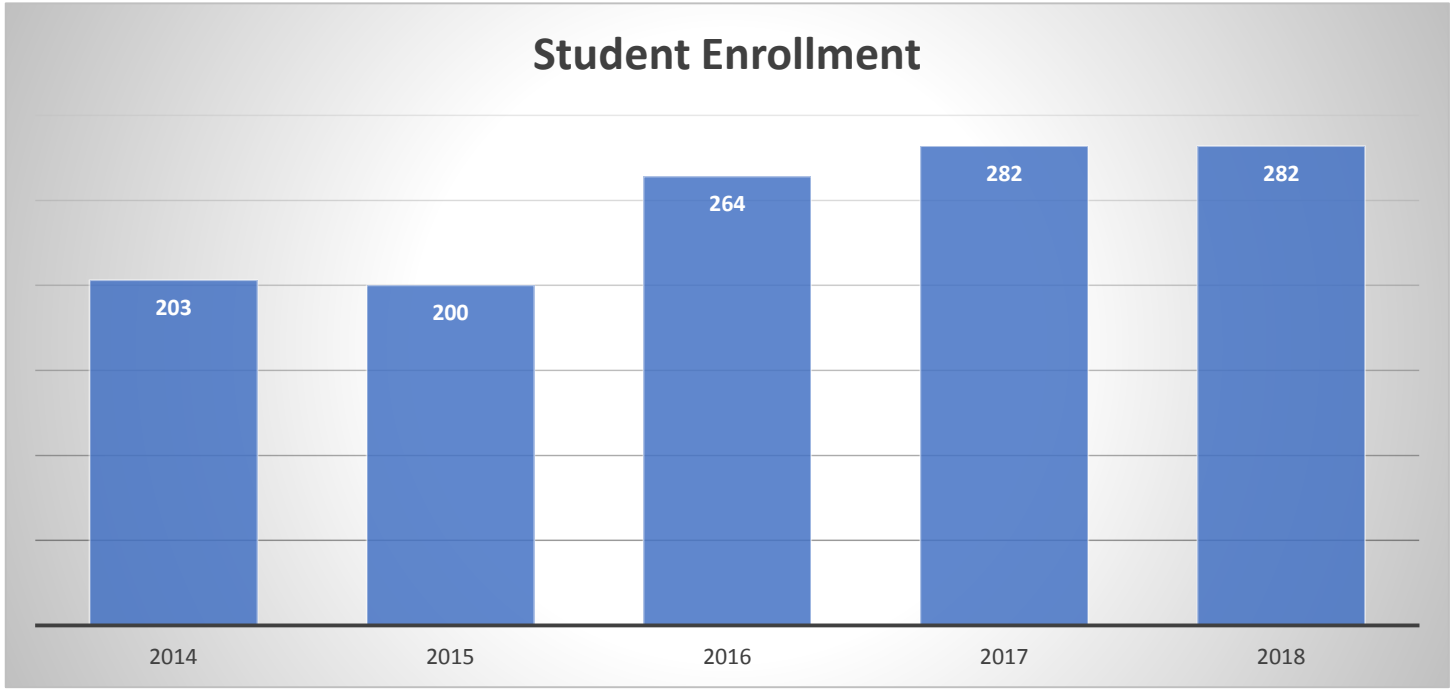
Proyecto Access STEP Mission and Objective

Mission: to identify historically underrepresented and economically disadvantaged secondary school students with the interest and potential for careers in STEM and other health-related areas and reinforce them in pursuit of these fields.

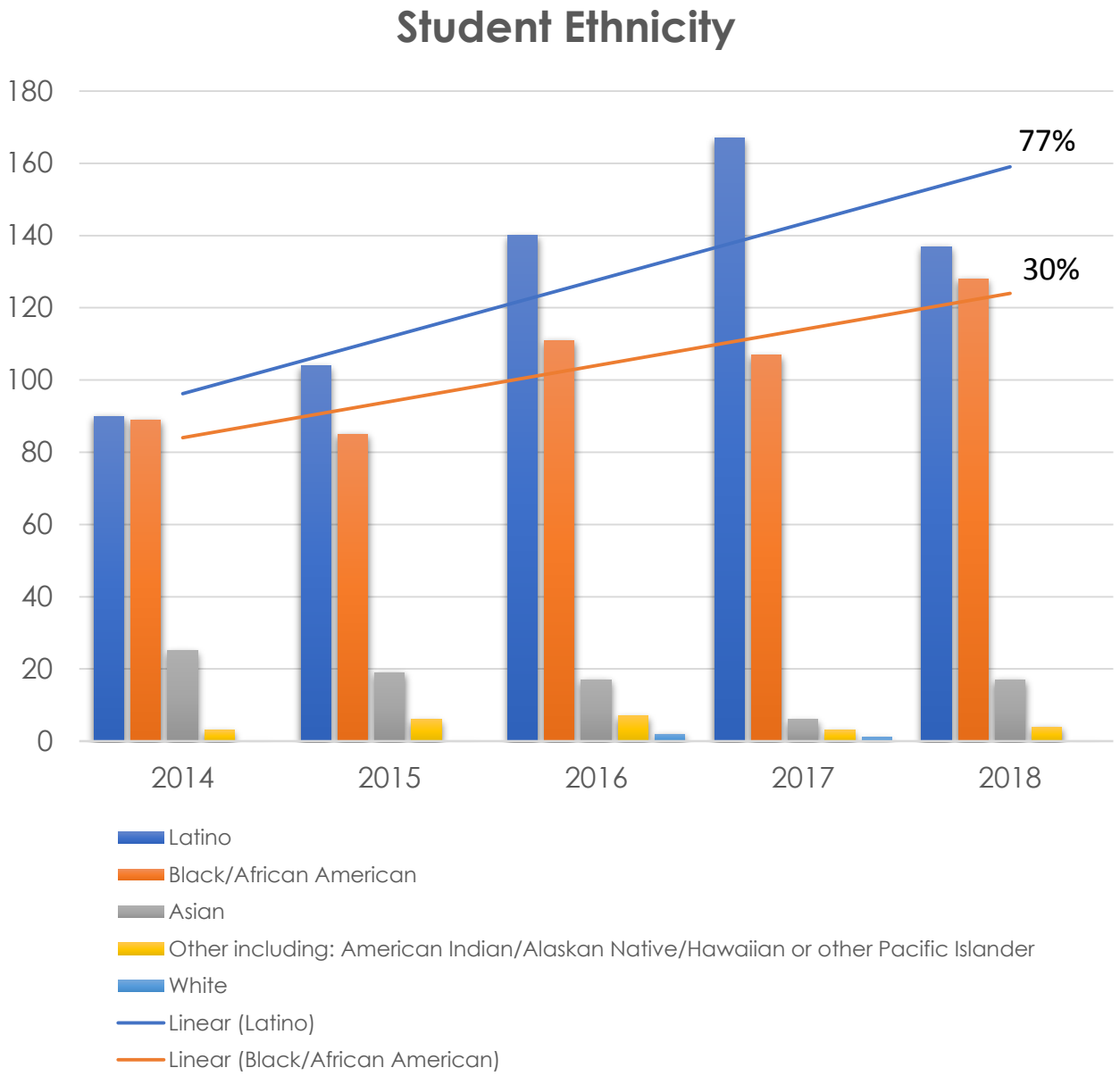
Objective: provide early exposure in STEM to minority students at the secondary school level, through hands-on and engaging activities.

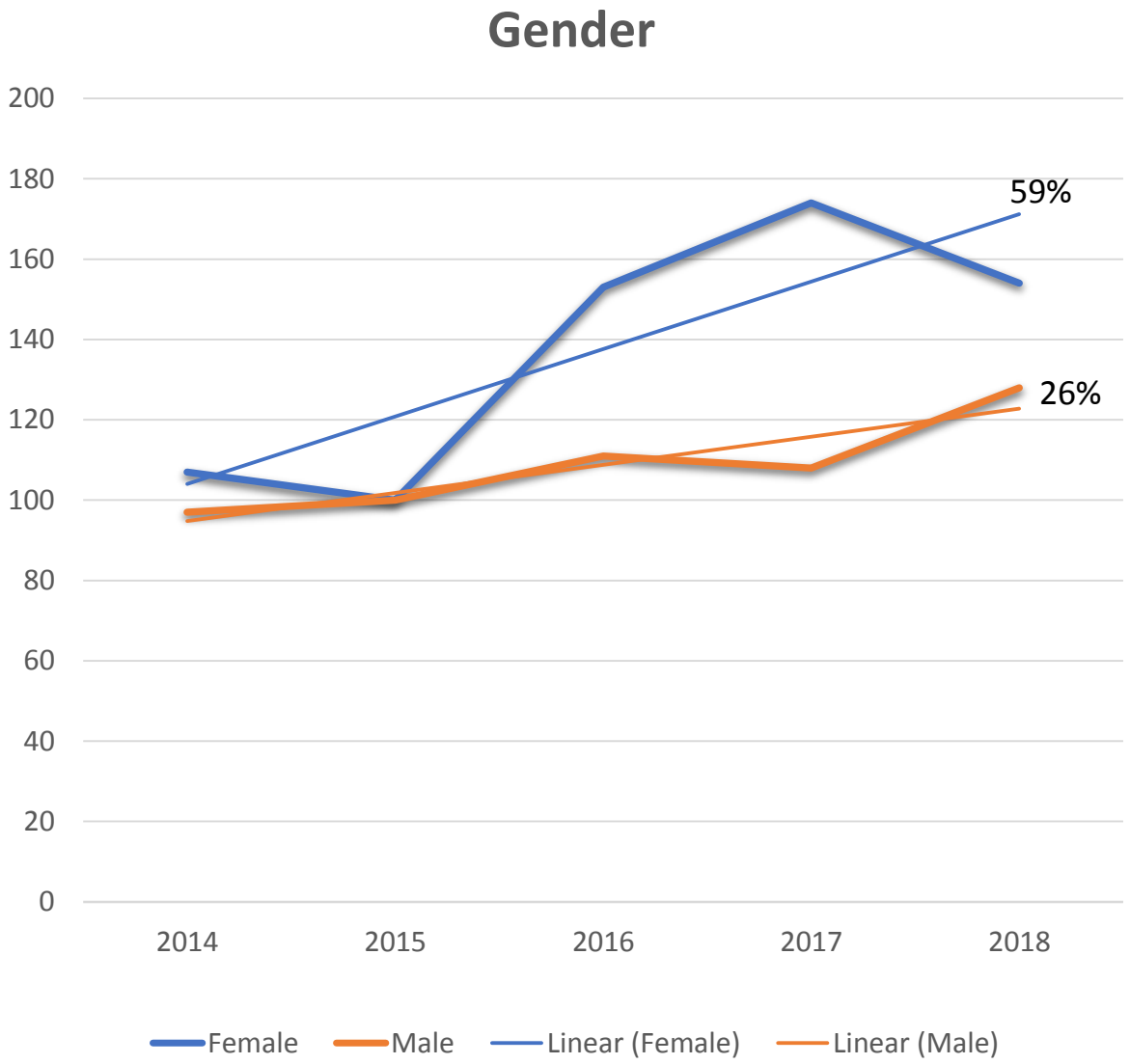
Program Data

The program served over 5,000 Hispanic secondary school students (7th-12th grades), providing them with early and continuous exposure in STEM courses through hands-on activities and research experiences.



Program Student Demographics





Program Offerings

Year-round activities:

- Rigorous seven-week summer session followed by an after school program during the academic year
- Enrichment courses and tutorial services are provided in Mathematics, Physics, Chemistry, Science, Technology, Engineering, Computer Science, Robotics and health related fields
- Professional opportunities in Science, Engineering and Technology, engaging them in hands-on and research activities, which will Prepare them for STEM majors in higher education

Summer Session

Students receive **four stages of preparation** in diverse STEM contents:

1) engineering and astrophysics projects;
2) computer software training; and
3)research training in STEM.

PREP I (7th-8th Grade)

PREP I	9:00 – 10:15	10:20 – 11:35	11:40 – 12:40	12:45 – 2:00	2:00 – 3:00
A-1	Computer Science-ALICE, C++, HTML, PHYTON	Engineering I-Tower Project	LUNCH	Algebra	Tutoring
A-2	Engineering I-Tower Project	Algebra Common Core	LUNCH	Computer Science	Tutoring
A-3	Algebra Common Core	Computer Science	LUNCH	Engineering I	Tutoring
A-4	Algebra Regents Preparation	Living Environment-Coastal Resiliency	LUNCH	Afterschool Universe	Tutoring





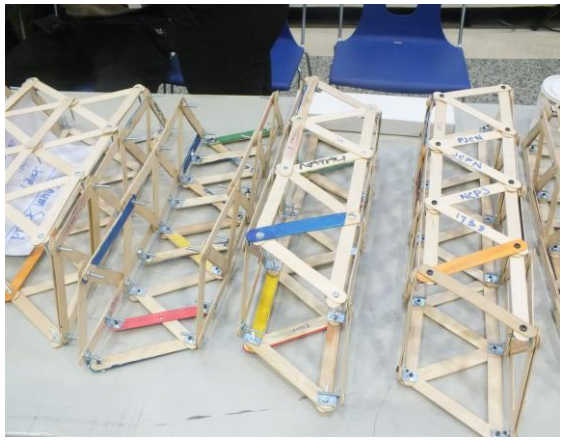


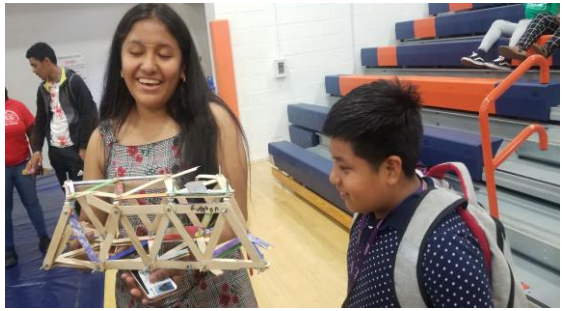

PREP II (9th to 10th Grade)

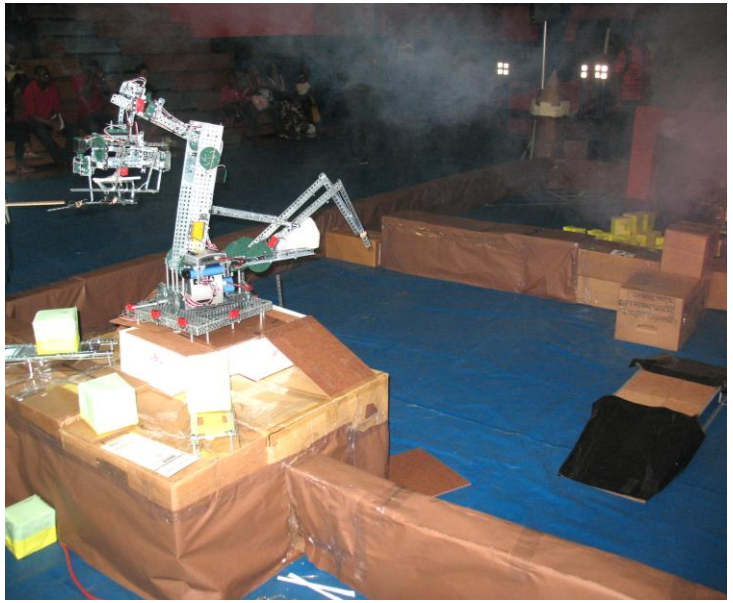
PREP II	9:00 – 10:15	10:20 – 11:35	11:40 – 12:40	12:45 – 2:00	2:00 – 3:00
B-1	Living Environment-Coastal Resiliency	Geometry	LUNCH	English	Engineering II
B-2	Chemistry	Engineering II	LUNCH	Geometry Regents	English
B-3	Robotics	Chemistry	LUNCH	English	Algebra 2/ Trig

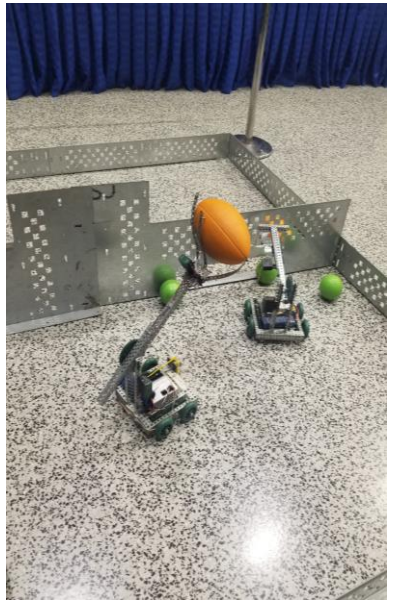
PREP III (10th to 11th Grade)

PREP III	9:00 – 10:15	10:20 – 11:35	11:40 – 12:40	12:45 – 2:00 pm	2:00 – 3:00
C-1	Physics	Robotics	LUNCH	Algebra 2/ Trig	Tutoring



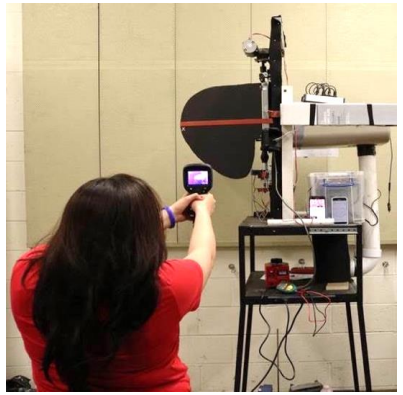






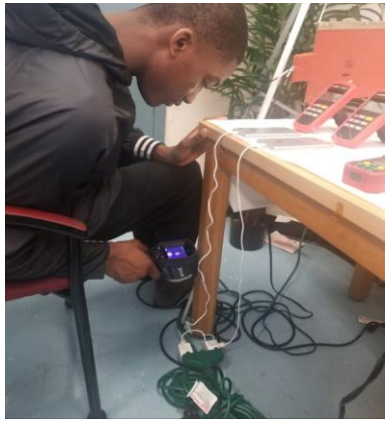
PREP IV (11th to 12th Grade)

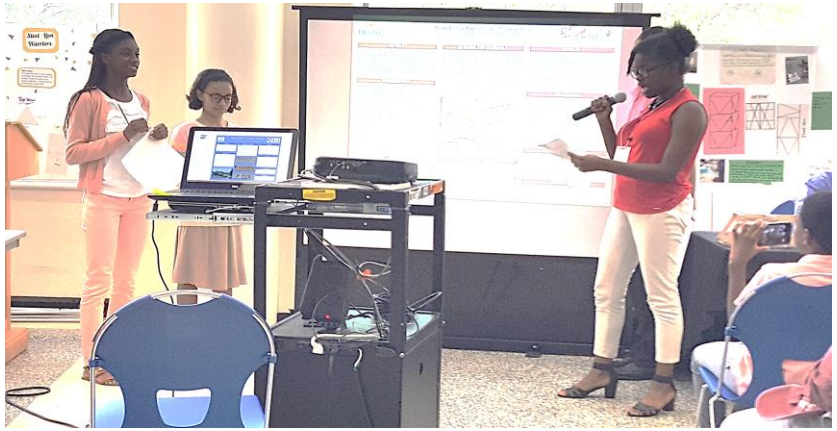
PREP IV	9:00 – 10:15	10:20 – 11:35	11:40 – 12:40	12:45 – 2:00	2:00 – 3:00
D-1	Game Design	College Prep	LUNCH	Pre-Calculus	Research



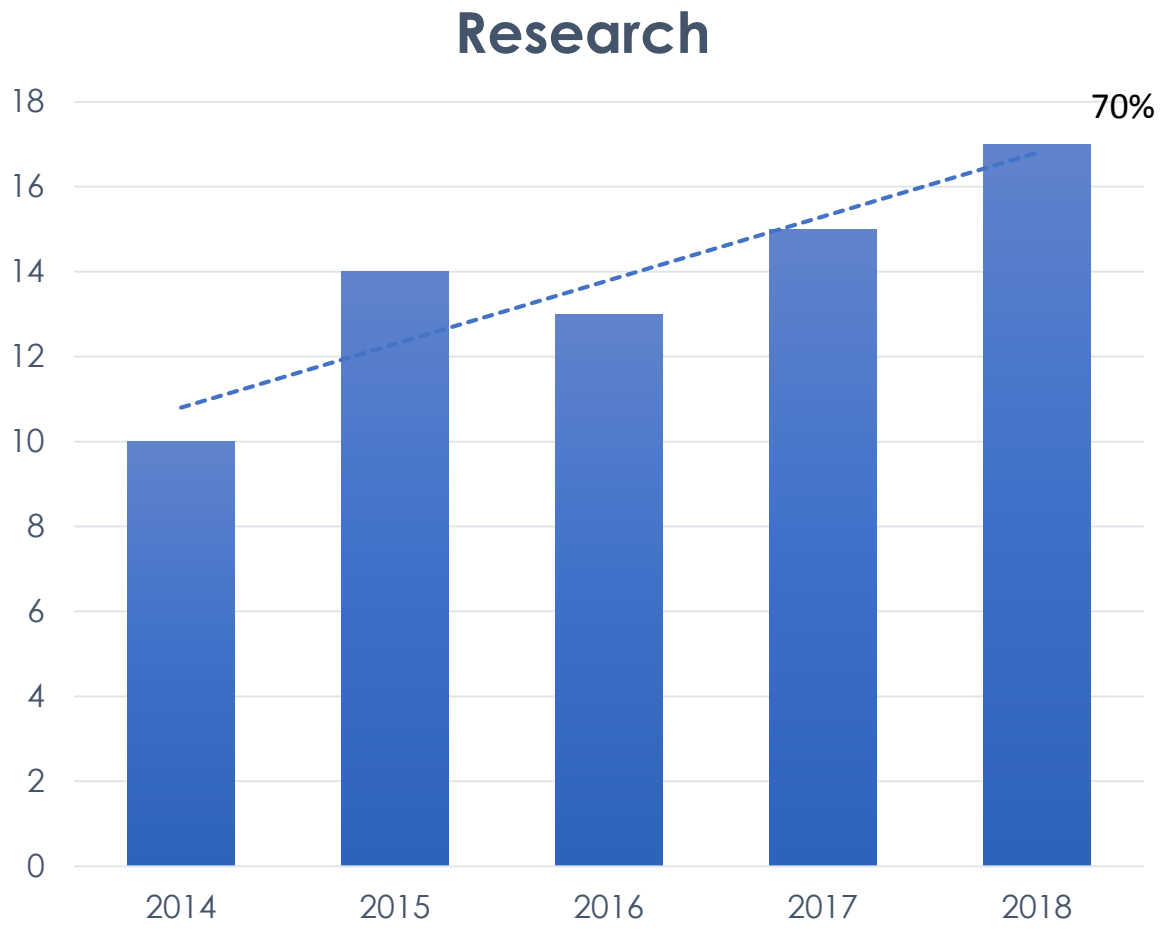
Academic Year

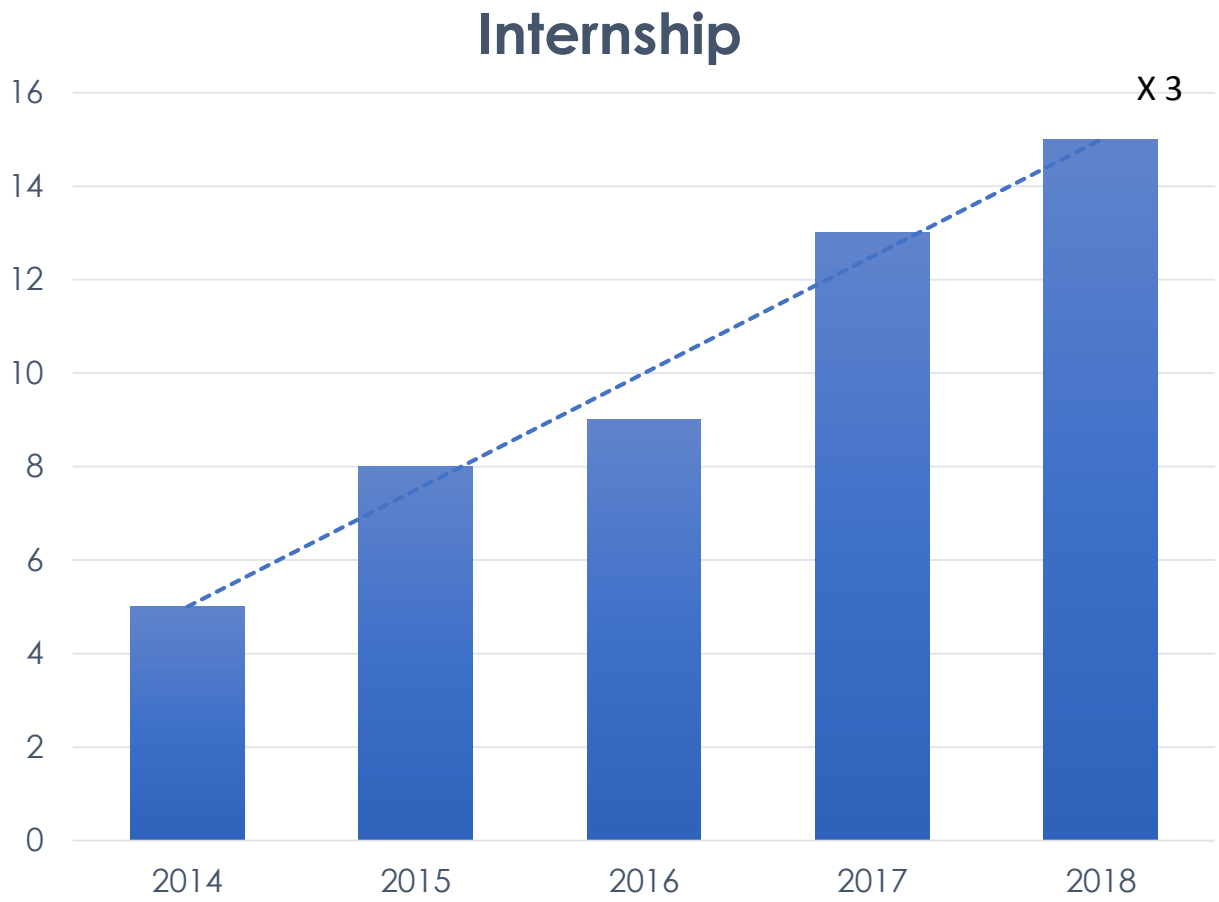
Group	Grade	10:00am – 11:30am	11:30am – 1:00pm	12:00pm – 2:00 pm
Science Technology Entry Program	7th-8th	Computer Science & Technical Skills Development	TUTORING	Research*
	9th -10th	English & Technical Writing	TUTORING	
	10th-12th	TUTORING	English & Technical Writing	
S.A.T	Standardized Admission Test Preparation			





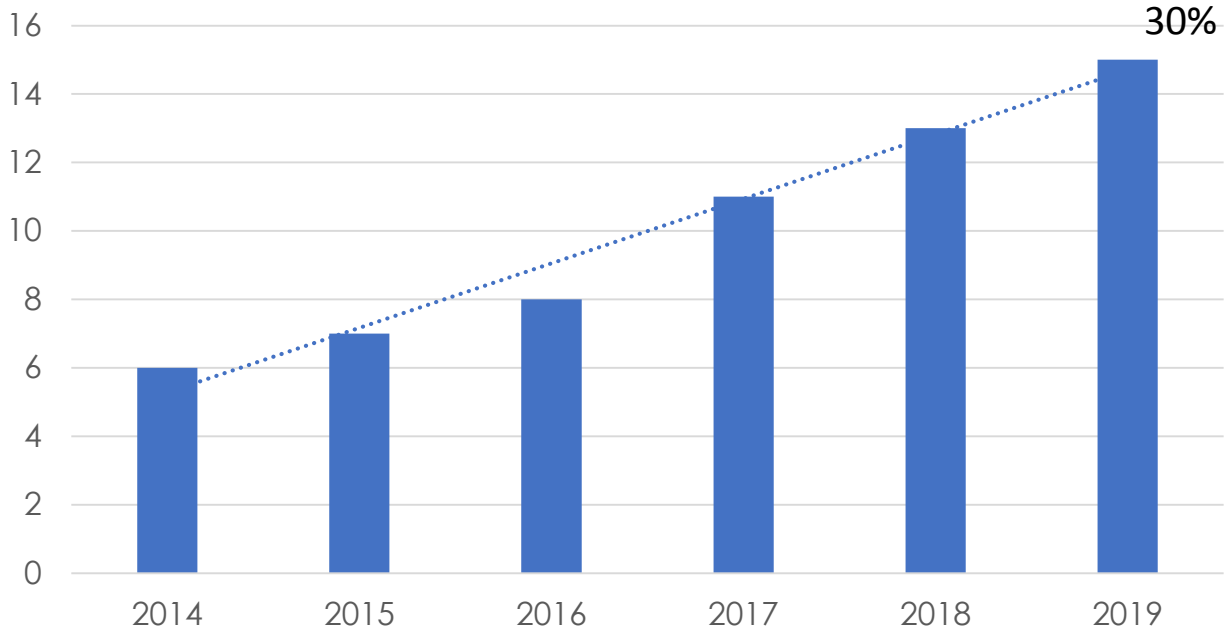
Student Involvement in Research and Internship





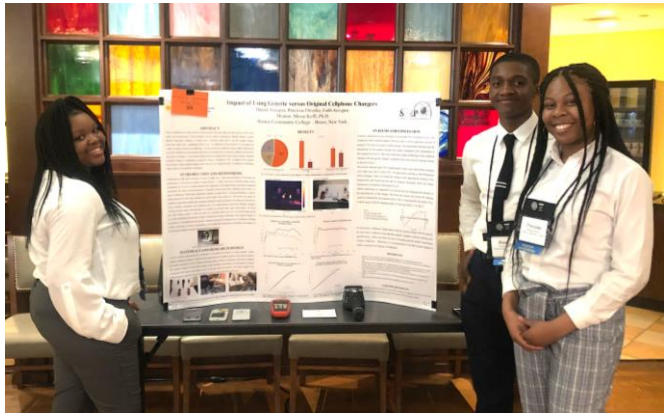
Statewide and National Conferences

Conference Participation



Awards

2019	➢ 1st Place Technology ➢ 3rd Place-Physical Sciences
2018	➢ 1st Place Engineering ➢ 2nd Place-Biological Sciences
2014	3rd Place- Physical Sciences
2011	3rd Place- Technology Division




Hostos Community College
GRAND CONCOURSE
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Conclusion

PBL increases students' understanding of theoretical concepts

80% of our students have developed positive attitude towards engineering and science

Early and Continuous exposure fosters students' interest in STEM disciplines

Research increases their persistence toward a STEM degree.

Implementation of CSTEP to serve undergraduates increasing the STEM pipeline

Activity: Cosmic Survey

Afterschool Universe

Cosmic Survey: Background

- Many Astronomers believe that our Universe began with a Big Bang that occurred over 13 billions years ago.

- However, the true size of the Universe is not known.
  - No one knows how far light has travelled since the Universe was born.

- Many people know the names of objects in space, but it is difficult to picture their relative size, distance, age, and how they fit in the Universe as a whole.

- The stars all seem the same at distance away and the Moon can appear closer or farther away depending on whether you observe it near the horizon or higher in the sky.

- Pictures of distant or close objects all seem the same size because there is no indication of scale.

Objectives

- Explore the idea of sorting and categorizing in general
- Explore multiple means of sorting and organizing objects in the Universe
- Improve students' understanding of the size, structure, and evolution of the Universe.

Definition of Objects

Afterschool Universe

Acknowledgments

- Hostos Community College, CUNY
- HACU
- NASA
- NYSED
- CBO Partners

QUESTIONS?

Contact: Dr. Moise Koffi, mkoffi@hostos.cuny.edu
Mrs. Diandra Jugmohan, djugmohan@hostos.cuny.edu
Mrs. Briseida Cortez-Rodriguez, bcortez@hostos.cuny.edu