

Developing an HAB Undergraduate Research Program at the City Colleges of Chicago

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Academic High Altitude Conference
John D. Odegard School of Aerospace Sciences
University of North Dakota
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Shared goals for STEM Education

1. For the United States to retain its leadership role in STEM fields we have to increase both quantity and quality of students pursuing STEM degrees.
2. To enable non-science majors to participate in the public discourse about health care, environment and other STEM-based issues and make personal decisions informed by STEM, we need to improve the quality of general education courses.

Evidence-based strategies

- **Increasing the number of students pursuing STEM degrees:**
Reach out to students from groups that are traditionally underrepresented in STEM fields, such as minority groups and women
- **Improving the quality of STEM education:**
Integrate authentic research experiences, especially early on during students' college careers.
- **Increasing scientific literacy:**
Replace “cookbook and taxform” labs with authentic, open ended labs in general education courses for non-science majors.

Undergraduate Research is effective!

AAC&U—Five High Impact Practices

- First-Year Seminars
- Learning Communities
- Service Learning
- *Undergraduate Research*
- Capstone Course and Projects





Why work with community colleges?

Large

- 13 million students (44% of all undergraduates in the US)
- 50% of recent science, engineering and health graduates attended a community college for part of their education.
- 64% of all students enrolled in Illinois public higher education attend community colleges.

Diverse

- 40% of students are from underrepresented minorities
- 59% receive financial aid

Untapped

- 43% of all first-time freshman in the US
- 42% first generation college students

Their students are also our students

- 41% of new degree seeking undergrads at DePaul are transfer students



THE WHITE HOUSE SUMMIT ON COMMUNITY COLLEGES



Summit Report

JUNE 2011





Developing Early Undergraduate Research at a Two-Year College

Kendra Sibbernsen, Metropolitan Community College, Omaha, NE

Two-year college (TYC) physics teachers are not often required to provide student research experiences as a part of their contracted duties. However, some TYC physics faculty members are interested in developing research opportunities for their freshman- and sophomore-level students, often called “early undergraduate research” (EUR). Here are some suggestions if you are interested in developing and managing EUR at your TYC.

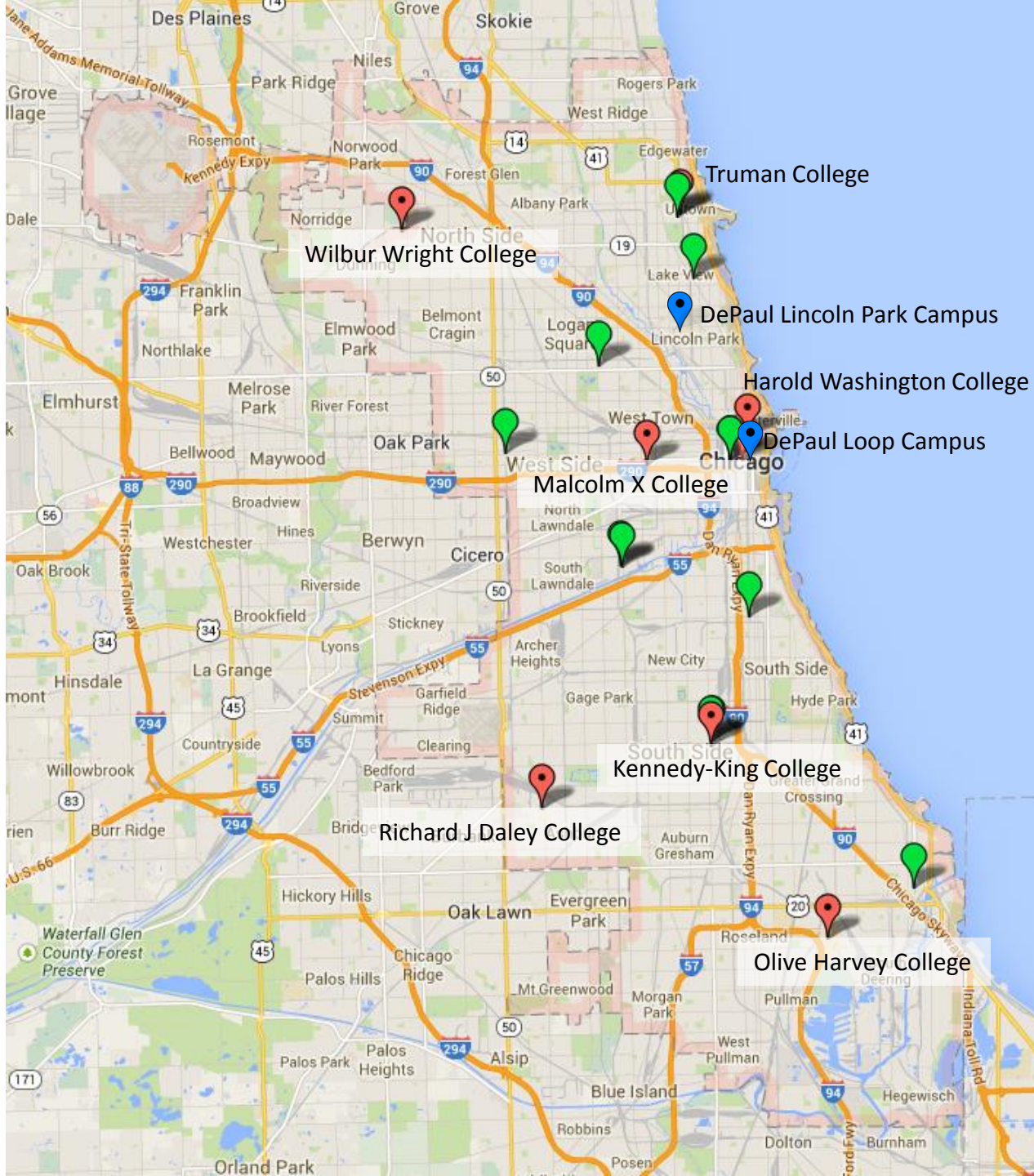
Where do I find ideas and support?

Start with your own interests. If you find the topic interesting, you will be more likely to share your enthusiasm for the science with the students. In addition, if you have background knowledge in that field, you may be able to help



The author (left) poses with her students after retrieving their payloads from a high-altitude ballooning experiment in 2012.

The Physics Teacher, November 2013





Who are the City College students?

- 120,000 total enrollment (24,000)
(62,000 credit career; 31,000 FTE)
- 37% African American (9%)
- 35% Hispanic (14%)
- 18% White (55%)
- 7% Asian (7%)
- 62% Female (53%)
- \$89 per credit hour (\$570)

(comparison numbers in parentheses are for DePaul University)



Previous programs

- Chicago Initiative for Research and Recruitment in Undergraduate Science (CIRRUS)
 - funded by NSF from 2008-2014
 - Students from two of the City Colleges and DePaul
 - HAB summer research in 2009 and 2013
- STEM-ENGINES NSF URC
 - Summer research
 - City Colleges plus three other Chicago-area community colleges
- Taylor University HARP NSF CCLI grant
 - Funded City College faculty workshop in summer 2013
 - Participants from all seven City Colleges

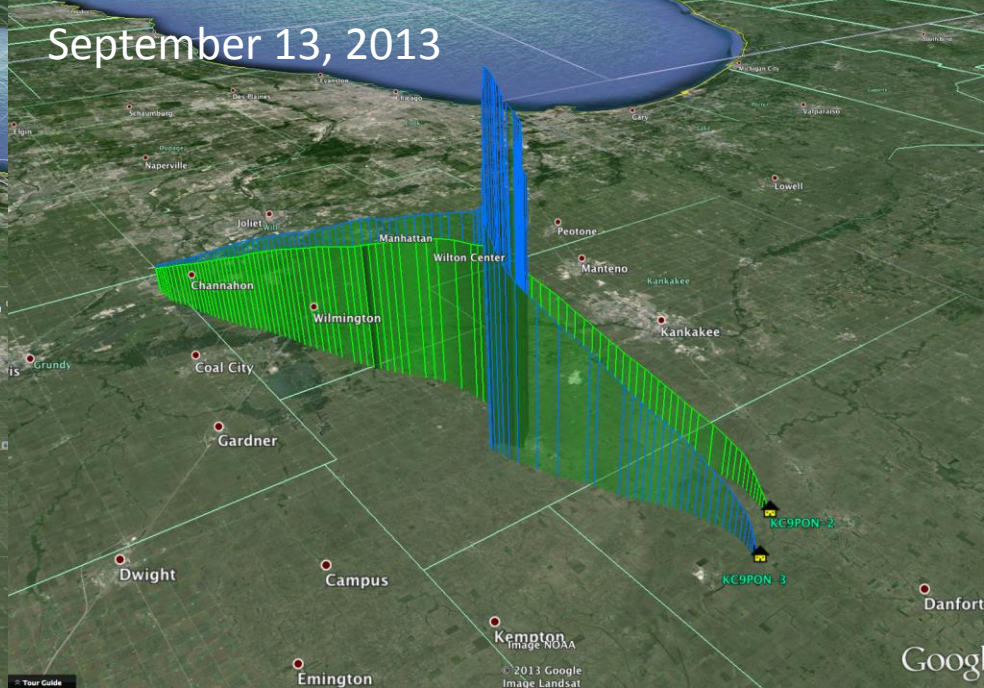
July 12, 2013



August 16, 2013



September 13, 2013



DEPAUL
UNIVERSITY



CITY COLLEGES
of CHICAGO
Education that Works



Leadership Team

- Tom Higgins
Chair, Physical Sciences Department, Harold Washington College.
- Mike Davis
Interim Vice President, Wilbur Wright College
- Vinay Dugal
Mathematics, Wilbur Wright College
- Christine Agulia
Communication, Truman College
- Bernhard Beck-Winchatz
STEM Studies Department, DePaul University

Future Plans

Submitted Illinois Space Grant Consortium Proposal to NASA:

- 3-4 week classroom research modules (non-science majors)
 - Focus on scientific method
 - Data from previous flights
- Summer research (science majors)
 - Modeled after CIRRUS summer research programs
 - Competitive recruitment
 - 6-8 students per faculty mentor
- Academic year research and outreach (science majors)
 - Continue summer research
 - Help with classroom module development
 - Outreach to grades 6-12 students through Malcolm X Saturday Academy
- Faculty development workshops
 - City Colleges
 - Suburban community colleges
 - Downstate community colleges

Questions?