



Nanotechnology Undergraduate Education (NUE) in Engineering Program

NSF Nanoscale Science and Engineering Grantees
Conference

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NUE in Engineering Program Info

- Cross Directorate Program-ENG, SBE, EHR, initiated 2003
- Nanoscale engineering education with relevance to devices and systems and/or societal, ethical, economic, and/or environmental issues relevant to nanotechnology
- Total-145 awards; \$21.8 M
- 41 active awards; 27 states; 37 institutions; including 2 HBCUs; 2 MSIs, 2 small colleges
- Program Evaluation-2011



NUE in Engineering Program Characteristics

Emphasis on new approaches to undergraduate engineering education through interdisciplinary collaborations leading to:

- New undergraduate engineering courses, degree and certificate programs, curricular enhancements
- Development and dissemination of new teaching modules into existing courses
- Incorporation of undergraduate research opportunities in nanoscale engineering into the curriculum

Nanotech Innovations

Enterprise

John Jaszczak, Michigan Tech

EEC-0741490

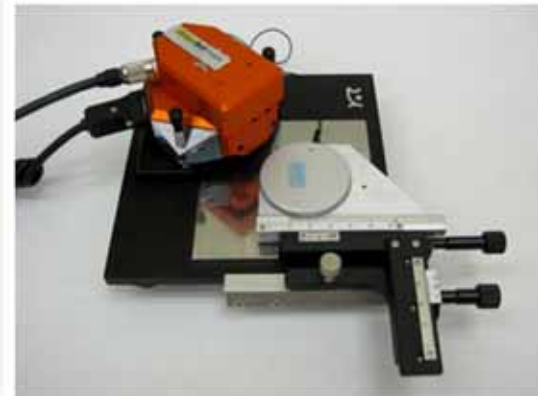
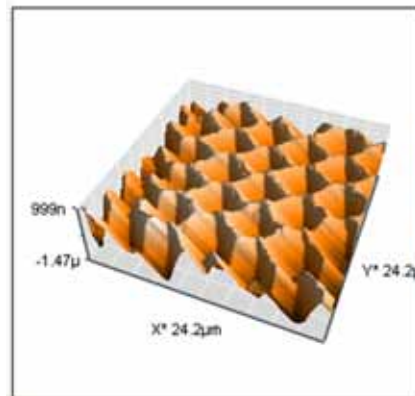
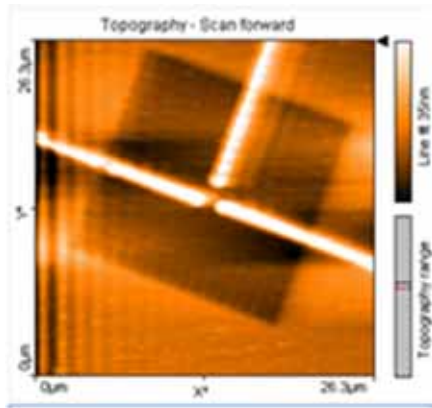
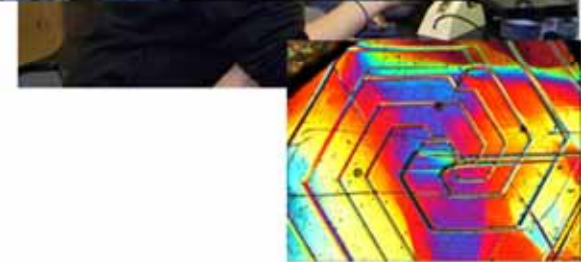


- Hands-on, goal oriented entrepreneurial experience
- Student-run
- Nanotechnology-related products and services
- Outreach & Education

- Started in 2008
- 20 current team members
 - 47 members over 3 years
 - Strongly interdisciplinary

Technical Projects

- Naturally Graphite™*
 - STM Tip Etcher
 - AFM XY Stage
 - AFM Educational Sample Kit
 - Lego Mindstorms SPM
- Products on or near market-ready



Outreach & Education

3 Teacher Workshops

6 Undergraduate Explorations

- >2,300 High School Students
- Summer Youth Program
 - Women in Engineering
 - Explorations in Engineering



Lego Mindstorms® SPM



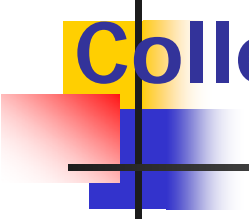
**Nanotech
Innovations**
Scanning Probe
Macroscope

CLICK IMAGE TO PLAY MOVIE

Popular interactive machine designed and built (including all software) by the enterprise. Uses include:

- Outreach Events
- Student Workshops teaching principles of AFM
- High School Enterprise project with Chassell High School

Extension of Nanomaterials Course Development to CUNY Community Colleges



Ilona Kretzschmar (lead PI, ChE)
The City College of New York (CCNY)
EEC-1042082

Co-PIs:

Vicki Flaris (Bronx Community College)

Mohammed Sohel (Hostos Community College)

NUE#1: Nanomaterials Course and Lab



AFM Module of Nanomaterials Laboratory at CCNY

Materials Developed:

- 20 sets of lectures
- 5 Laboratory Modules
- 1 Nanotech Module
- 1 Nanotech Nuggets

Courses Offered:

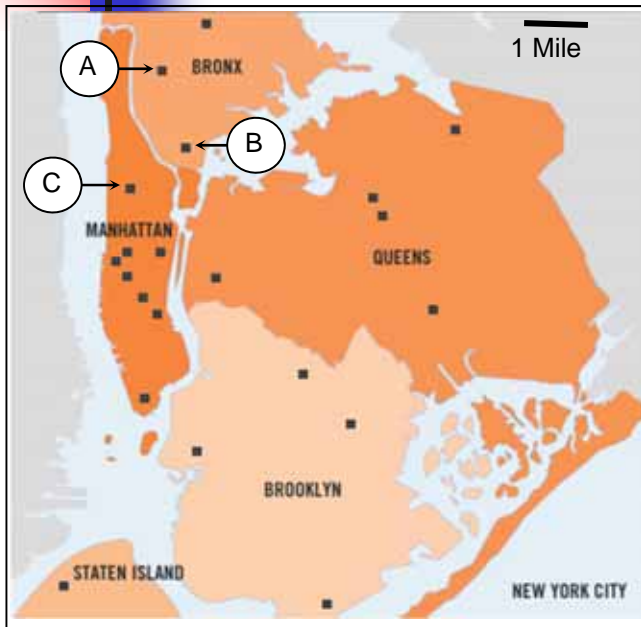
- 3x Nanomaterials
- next: Spring 2011
- 2x NanoMaterials Lab
- next: FS2011 or SP2012

Student Statistics:

	total	F	M
URM			
Course:	55	23	32
16			
Lab:	18	9	9
5			
Module:	288	not tracked	
Nugget:	15	not tracked	

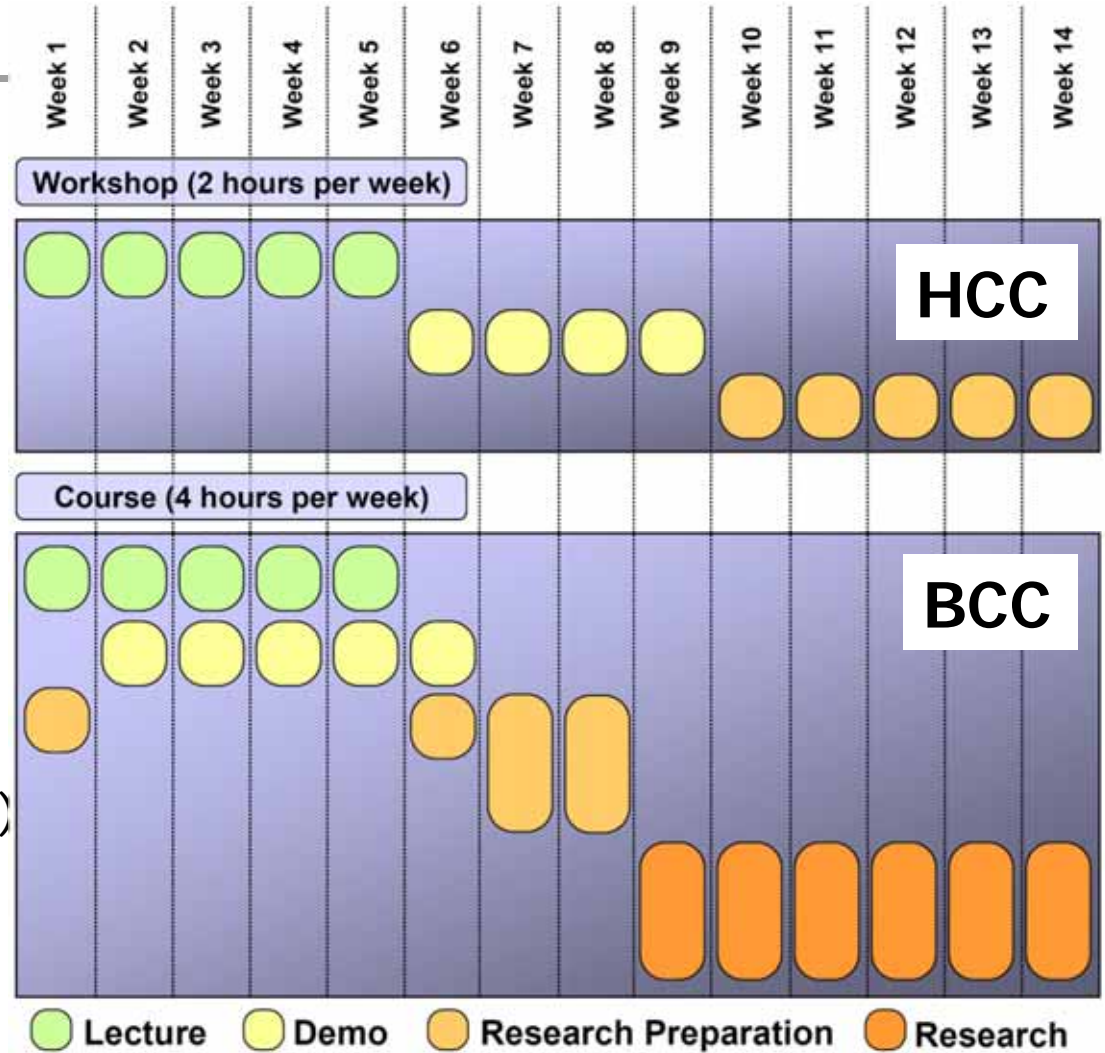
NUE#2: Nanomaterials at BCC/HCC

CUNY College System



- Ⓐ Bronx Community College (BCC)
- Ⓑ Hostos Community College (HCC)
- Ⓒ City College (CCNY)

Planned Workshop & Course Sequence

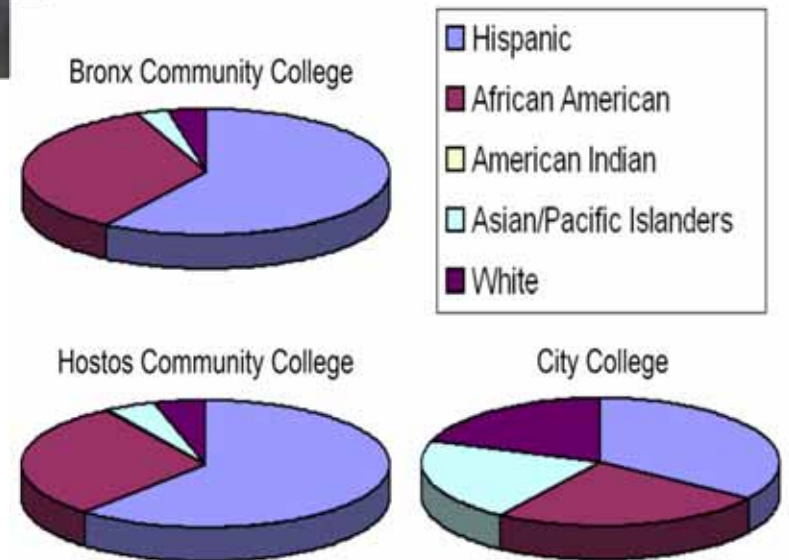


NUE#3: Nanomaterials at BCC/HCC



Prof. Vicki Flaris advertising the new Nanomaterials course (Spring 2011) to her students at Bronx CC.

Student Diversity



NUE: Teaching Nanosystems Engineering with Active Learning Experiences



Louisiana Tech University, EEC-0407097, Hisham Hegab




- Preparing a diverse, globally engaged STEM workforce
- Impacted students from elementary school to sophomore-level undergraduates
- Helped establish **first B.S. in Nanosystems Engineering degree program in the U.S.**
- 1st graduates May 2007

Web-based Communications Portal

<http://www.nuecommunity.com>




Nanotechnology Undergraduate Education In Engineering



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Hands-On Nanoscience

BY NSF


A new hands-on, lab-based, introduction to nanoscience and technology was developed for freshman and sophomores at the University of Virginia. The course uses breadth-first active-learning methods that team members have employed successfully in previous introductory courses. The class builds upon the observation that, while nanoscience has attracted much public attention, popularizations are often based on fundamentally flawed science. The project ...

[Read more...](#) ♦

Groups



Development of the NanoEngineering Minor [...]



An Interdisciplinary, Research-intensive Minor in [...]