Nanotechnology Undergraduate Education (NUE) in Engineering Program

NSF Nanoscale Science and Engineering Grantees Conference
December 7, 2011

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NUE in Engineering Program

- 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-155 awards; $23.8 M
- 41 active awards; 27 states; 37 institutions; including 2 HBCUs; 2 MSIs, 2 small colleges
- Program Evaluation underway-Manhattan Strategy Group
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
• 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

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

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:

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AFM Module of Nanomaterials Laboratory at CCNY
NUE#2: Nanomaterials at BCC/HCC

CUNY College System

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

Planned Workshop & Course Sequence

Week 1 Week 2 Week 3 Week 4 Week 5 Week 6 Week 7 Week 8 Week 9 Week 10 Week 11 Week 12 Week 13 Week 14

Workshop (2 hours per week)

Course (4 hours per week)

Lecture Demo Research Preparation Research

HCC

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