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Integrating Service-Learning Into Interdisciplinary Programs

Timothy P Cross, Ph.D, *Columbia University*
Jack McGourty, Ph.D, *Columbia University*
Adele Chase, *Barnard College*

COLUMBIA ENGINEERING

Center for
TECHNOLOGY,
INNOVATION
&
COMMUNITY
ENGAGEMENT

Integrating Service-Learning into Interdisciplinary Programs

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NYMAPS Symposium

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COLUMBIA | ENGINEERING
The Fu Foundation School of
Engineering and Applied Science

Columbia Engineering Mission

COLUMBIA ENGINEERING
Center for
TECHNOLOGY, INNOVATION & COMMUNITY ENGAGEMENT

Columbia University's Fu Foundation School of Engineering and Applied Science seeks to educate socially responsible engineering and applied science leaders whose work results in the betterment of the human condition, locally, nationally, and globally.

CTICE Twin Missions

COLUMBIA ENGINEERING
Center for Technology, Innovation & Community Engagement

Education

- Support Columbia Engineering School's mission to educate technologically adept and socially engaged students
- Enable students to solve complex problems and design innovative solutions that are culturally and contextually appropriate

Community

- Support capacity building and economic development in Harlem, Washington Heights, and Upper Manhattan
- Leverage strong community relationships to increase educational and entrepreneurial opportunities for community members

Community-Based Learning

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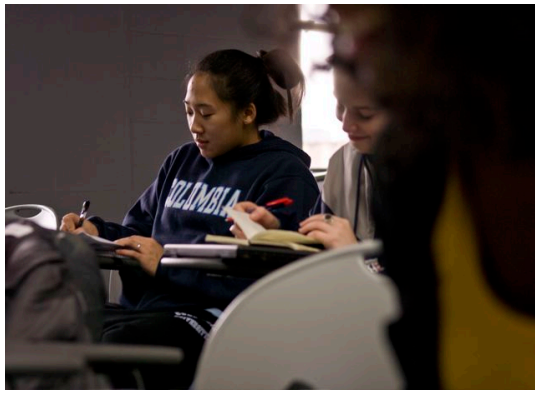
- Infused into all CTICE activities, including K-12 programming, workforce development, and Columbia-Harlem Small Business Development Center
- Links engineering curriculum to corporate, government, community, and global outreach
- Used in both curricular and co-curricular programming



First-Year Design Course

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- Required four-credit Engineering School "core" course for all students
- Integrates community-based learning into engineering design curriculum
- Teaches applied design skills, including advanced three-dimensional graphics and computer applications
- Teaches professional skills, including working in teams, managing projects, researching customer and market needs, solving open-ended problems, budgeting, and communicating

- Course undertakes more than 70 projects per year
- Projects focus on assistive technologies, urban problems, and educational challenges

Science, Technology & Society Courses

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- Two interdisciplinary courses
  - "Science and Technology in Urban Environments" (Fall semester)
  - "Science, Technology and Society" (Spring semester)
- Both courses explore impact of science and technology on modern society
- Both courses include community-based learning projects that focus on community economic development and asset building

ENGINEERING COMMUNITY-BASED LEARNING COURSES

Project Based

Team Based

Interdisciplinary

Client Driven

Community Focused

Science & Technology in Urban Environments

- Explores impact of science and technology in cities since Industrial Revolution
  - Focus on built environment, food, transportation, water supply and disposal, pollution, and services
  - Comparative, but with emphasis on New York City
- Team-based community-based learning project
  - Projects focus on urban infrastructure and services
  - Students work in interdisciplinary teams
  - Deliverables include final report and presentation

Science, Technology, and Society

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- Investigates the scientific and technical evolution and subsequent diffusion of contemporary technological innovations
- Structured to capitalize on students coming from various disciplinary backgrounds/concentrations to collaborate in the study of selected technology
- Only students who declared their concentration may register for this course
- Each team is required to select members from various departments and schools.

Entrepreneurship Courses

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"Managing Technological Innovation and Entrepreneurship"

- Advanced course that examines emerging technologies, and the effect of political, economic, social, and cultural factors
- Teams work with community leaders to propose new ventures for local low-income clients

"Managing Emerging Technologies"

- Graduate-level course that examines development of new technologies and transformative innovations
- Students work on economic development projects for local clients

Community-Based Learning Courses

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SCHOOL OR DEPARTMENT	COURSE	DESCRIPTION	COMMUNITY-BASED LEARNING COMPONENT
Engineering School	SNC 1002: Science, Technology, and Society	Investigates the evolution and diffusion of technological innovations.	Teams work on background research and new venture ideas for low-income families
Barnard College (Urban Studies Program)	V3310: Science and Technology in Urban Environments	Examines science and technology in cities since the Industrial Revolution	Teams work with urban leaders on economic development projects in low-income areas
Engineering School (IEOR Department)	E4998: Managing Technological Innovation and Entrepreneurship	Examines emerging technologies, and the effect of political, economic, social, and cultural factors	Teams work with community leaders to propose new ventures for local low-income clients
Engineering School (Civil Engineering)	CIEE E3260: Engineering for Developing Communities	Teaches "engineering that matters" in the context of under-privileged and developing communities	Students work on international projects in conjunction with Columbia chapter of Engineers Without Borders
School of Continuing Education (Executive Master's Program)	K4123: Managing Emerging Technologies	Examines development of new technologies and transformative innovations	Students work on real world problem for local clients

Next Steps

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- New interdisciplinary minors that require community-based learning
  - Entrepreneurship (established Spring 2007)
  - Environmental Sustainability (Fall 2010)
  - Science, Technology, and Society (Fall 2010)
- New interdisciplinary courses
  - "Theory and Practice of Social Entrepreneurship"
  - "A Social and Cultural History of Water"
- Grow projects and clients through Columbia-Harlem SBDC and community outreach activities
- Social Innovation Program