Engaging Science in Our Global Future:
Project Pericles’ Civic Engagement Course (CEC) Grant Program
Civic Engagement in Science: A strategy to address problems in science education

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Connecting Science Courses to Community

- Students apply what they learn in the classroom to community projects

- Philosophy of the Pedagogy of Engagement
  - Work with Community Partners to Design Projects
  - Win Win Solutions
  - Outcomes are accessed by all parties

- Benefits of the Pedagogy of Engagement
  - Additional method to motivate students
  - Classroom skills honed on community projects (Field Skills)
  - Promote Problem Solving Skills and Critical Thinking
  - Students learn ethics in science.
Challenges with Science-Based Community Projects

• More work for Instructors and Students

• Projects Require Additional Resources

• Relationships with Community Partners are not Trivial
Challenges with Science-Based Community Projects

• More work for Instructors and Students
  – Project administration and coordinating logistics is time consuming
  – Instructors efforts may to be recognized by traditional evaluation methods.
  – Students must be proficient in fundamentals for successful projects

• Projects Require Additional Resources
  – Travel, Equipment, Communication, Compensation
  – Teachers frequently dedicate personal resources to projects

• Relationships with Community Partners are not Trivial
  – Two-body problem → Three-body problem
  – Competing agendas
  – Win! Win! Projects are challenging to design.
Physics 168: Energy Conversions and Resources

• 1st physical science course at Occidental College with civic engagement component.

• Awarded Civic Engagement Grant, Project Pericles, NY

• Goals
  – Student recognize and quantify energy conversion processes important to industrial societies.
  – Students conducted energy audits for community partners
Physics 168: Energy Conversions and Resources

• **Results:**
  – Students conducted energy audits for community partners
  – Audubon Center, 1st platinum LEED facility in nation
  – Navajo Tribal Utility Authority and Sandia National Laboratories

• **Evaluations:**
  – Highest student evaluations of the Oxy Physics Department
  – The success of the community engagement measured by the degree to which community partners adopt recommendations of student projects.

• **Future implementations**
  – Course scheduled for Fall of 2009
  – Evaluate implementation of recommendations adopted the Audubon Center
  – Leverage LEED experience with green building movement in Los Angeles
2006 Mali Photovoltaics

- Sponsored student research projects in Timbuktu and Bamako, Mali

- **Kether Hayden** - gender and photovoltaic installations

- **Tope Sosanya** - political aspects of security of solar panel installations
2007 Ghana Geothermal Cooling

• Collaborated with local teachers to install a geothermal cooling system on a Faith Community School, Accra, Ghana

• Use the ground as a heat sink to cool circulating air.
2007 Geothermal Cooling in Ghana

- Students learn from Students
- Ghanaian students collect data and email Oxy students
2008 Efficient Wood Stoves, Uganda

- Stoves made of clay composed ~50% vol. Biomass
- Stoves from porous clay stoves uses 40% less wood

- Incorporated into Occidental’s Physics 250 Thermal Physics course
  - Students measured specific heat and thermal conductivity
- Two Oxy students awarded $6000 Richter Fellowship to work in Uganda
The ELSI of the Genome

- Ethical, Legal, Social Implications of the Human Genome Project
- Team Taught
  * Dr. John Esser - Sociologist with legal background
  * Dr. Ammini Moorthy – Geneticist with ethics background
- Topics Covered in the Course
  - Evolution, Social Darwinism and Eugenics
  - Genetics and The Human Genome Project
  - Reproductive technologies and bioethics
  - Genetic testing and Gene Therapy
  - Criminology and DNA Forensics
  - Genetically Modified Organisms (GMO)
  - Race and Genography and Genetic Discrimination
Course Objectives & Student Responsibilities

Objectives:
- Teach basic Human Genetics, Biotechnology and Genetic Engineering
- Encourage active participation in class discussions
- Explore the legal and social issues related to Biotechnology
- Debate whether the Eugenics movement is still with us
- Explore the impact of human genome research on society

Student Responsibilities
- Professionally participate in class-room debates, really listen to opposite points of view and learn from them
- Frame the issues, analyze them objectively for the greater good
- Propose alternative solutions and advocate their preference in front of a critical audience
Paper on an Issue
Major Civic Engagement Component

- Introduction
  - Clearly stated issue
  - Context and technical overview
  - Scientific, legal, ethical and social considerations

- Logical Analysis

- Action Plan to Resolve the Issue
  - Research- and literature-based specific action steps

- Anticipated Outcome of the Resolution
  - Near-term and far-term implications considered

- Slide Presentation to the Class
Example: ELSI of Human Embryonic Stem Cell Research

Identified Issues
- When does life begin?
- Is it a new form of Eugenics?
- Who owns the embryos?
- Commercialization of body parts
- Human rights and dignity

Action Plan
- Consulting religious groups and legal experts
- Educating the Public
- Developing appropriate legislation
- Alternatives to using embryos (e.g. Adult Stem Cells)

Outcome Assessment
- Sensitivity to religious freedom
- Informed Individuals will make better decisions
- Proposal of alternatives indicates pragmatism
Accomplishments and Areas for Improvement

Accomplishments

- Increased student awareness of ELSI issues
- Developed ability to do independent research leading to policy stands on critical civic issues
- Improved communications and debating skills

Areas for Improvement

- One semester is too short to delve deeply into crucial topics in this important area
- Need to use more of a multi-media approach to enhance learning
- Not adequately integrating the religious and philosophical implications
Instructors’ Perspective

- Team teaching is essential since civic engagement issues tend to be multi-disciplinary.
- Issue-based reflective form of writing in this course (as opposed to a purely scientific form of writing) stimulates the students to think of social problems stemming from development in the sciences and to take a stand on solutions.
- Class discussions and slide presentation improve the students’ communications and debating skills.
- The course format can be replicated to cover other scientific and non-scientific disciplines and related social issues.
Year of Health

Join Allegheny in a year-long exploration of health through multiple disciplinary lenses.
Mechanisms of Engagement

- Guest lectures
- Faculty panels
- Film screenings
- Class collaborations
- Reading groups
- Health-related classes
- Community health initiatives
- Service activities
- Faculty panels
Mission Statement

The Year of Health is designed for Allegheny campus and community members to:

- examine health on the global, community, campus, and individual levels
- explore key factors that contribute to ill health, such as:
  - access to health care and health / risk disparities
  - environmental, physical and genetic contributions to disease
  - ethics and policies that impact health and health care
  - how individuals and media portray and contribute to health and disease
- evaluate local, regional and global strategies to improve health
Water & Health Collaborative
Logistics of a Four-Course Collaboration

- Hand-pick colleagues
- Plan one year in advance
- Arrange classes to meet concurrently
- Select topic for broad applicability
- Allow each faculty to spearhead different aspects of collaboration
- Anticipate student anxieties
- Provide opportunity for reflection

Physical Geology

Class Size: 28
Student body: Geology majors, and non-majors fulfilling science distribution

Rhetoric and Civic Engagement

Class Size: 15
Student body: Advanced majors and minors with little disciplinary training

Environmental Problem Solving

Class Size: 20
Student body: Env Sci majors, and non-majors fulfilling writing distribution

Health Policy

Class Size: 35
Student body: Advanced political science majors and pre-med students

Water & Health Collaborative
Water & Health Collaborative

Cross-course lectures

Guest speakers

Shared readings

Multi-disciplinary group projects
Partners

Steering Committee
- Caryl Waggett, Environmental Science
- Dave Roncolato, ACCEL
- Kirsten Peterson, Pre-Health Programs
- Ron Cole, Geology
- Vesta Silva, Communication Arts
- Melissa Comber, Political Science
- Jaqueline Kondrot, Office of Wellness
- Duane Koller, Meadville Medical Center
- Mike Downing, Community Health Services
- AnnaLiisa McGlinn, Oncology Wellness Institute
- Barb Steadman, Public Affairs
- Sue Plunkett, Health Center
- Betsy Miller, Athletics
- Jane Ellen Nickell, Office of Religious Life
- Sonja DeJong, Student Coordinator
- Hillary Bedell, Student Intern
- Krys Castillo, Student Web Manager

Funding and Support
- Project Pericles
- Demmler Award for Teaching Innovation
- Public Health and Liberal Education program;
  Public Health and Educated Citizen program,
- American Association of Colleges and Universities (AAC&U)
- Association of Prevention Teaching and Research (APTR)
- Allegheny College
- US Environmental Protection Agency
- Council of Environmental Deans and Directors (CEDD)
- Crawford Heritage Foundation
- Meadville Medical Center
- Community Health Services
- Oncology Wellness Institute