Interdisciplinary Teaching

A personal view

George Middendorf
Department of Biology
Howard University
A tip of the hat to my interdisciplinary teaching partners

- Muriel Poston
- Joe McCormick
- Chuck Verharen
- Bruce Dahlin
- Greg Jenkins
- Rebecca Reviere
Thanks also to

- Barbara Griffin
- Teresa Redd
- Joe Reidy
Background

- Defining interdisciplinary
- What’s needed for interdisciplinary to work?
- Why interdisciplinary?
- Examples
Science & Public Policy

- Dr. Joseph McCormick, Political Science
- Worked together on a COAS Committee ~1988
- Initial discussions began over lunch ~1990
- S&PP first offered in Spring 1994
Environmental Studies

- Dr. Bruce Dahlin
  - Sociology/Anthropology

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- Dr. George Middendorf
  - Biology

- Dr. Muriel Poston
  - Biology

- Dr. Charles Verharen
  - Philosophy

- Developed to fulfill ‘new’ general education, interdisciplinary, foundational requirement

- First offered ~Fall 2001
FRSM100-ENGL003

- Pilot interdisciplinary course in Sp 2007
  - Introduction to Interdisciplinary Research: The Katrina course
  - Writing for Research

- Pilot expansion in Sp 2008:
  - Abolition 1807: Merchants,Morals & Myths
  - China in Africa
  - Conflict, Political Violence & Terrorism
  - Experiencing Modern Exile
  - Food
  - Writing for Research
Personal Outcome

- Taught & learned
- New perspectives
- New insights
- Better understanding
  - Of conceptual ideas, issues, problems and even my own discipline
Taught

SCIENCE

PUBLIC POLICY
Learned

I. Science with little or no public policy; misinformed PP

II. Public policy with little or no science; flawed/distorted S

III. Complementary science and public policy

IV. Contentious S & PP
SOCIAL CONTEXT

OBSERVATION

HYPOTHESIS

EXPERIMENT
data collection & analysis

INTERPRETATION

THEORY

PARADIGM

SCIENTIFIC CONTEXT
EXPERIENCE
of participating scientists

PRODUCT
Accepted, normative science
“Learned” history
“Approved” experiments

PROCESS
- Observation
- Idea
- Hypothesis
- Experimentation
  - Data collection
  - Data analysis
- Interpretation
- Comparison to work of others

PARADIGM
Alternative, competing “schools”? 

FUNDING & OTHER FACTORS
- Legislative branch influences
- Executive branch influences
- Agencies
- Scientists – peer review process
- Public
- Applied vs. Pure Science [need?]
A Example of Perspective

A pome (apple; *Malus*) that has an enlarged, edible fleshy stem. The seeds are contained in the center section that we, typically, do not consume.
Another edible fruit (grape; *Vitis*) which has an enlarged pericarp that develops from the ovary wall. Seeds may or may not be present.
Yet, another edible fruit (banana; *Musa*)- the cultivated form is triploid, seedless, and has an edible inner core.
A drupe. In this case, an edible fruit (peach; *Prunus*) in which we consume the mesocarp while the hardened endocarp encloses the seed.
Fruit stall, Barcelona

wikipedia
World’s largest fruit cocktail can
Slow food
Background

**Defining interdisciplinary**

What’s needed for interdisciplinary to work?

Why interdisciplinary?

Examples
Defining interdisciplinary

- **Disciplinary**
  
  Focus on a discrete subject with its characteristic regimen of investigation and analysis

- **Multi/cross/trans-disciplinary**
  - Disciplines working side by side in an additive manner
  - Efforts to view one discipline from the perspective of another
  - Issues that go beyond the domain of a single discipline

- **Interdisciplinary**
  - Activity that occurs between, often unrelated, disciplines that results in productive synthesis

- Will we know it when we see it?
Defining interdisciplinary

- Disciplinary
- Multi-disciplinary
- Interdisciplinary
- Background
- Defining interdisciplinary
- What’s needed for interdisciplinary to work?
- Why interdisciplinary?
- Examples
Interdisciplinary requires:

- Consideration of multiple perspectives and approaches
  - Scientific method in the Natural Sciences
  - Deconstruction in the Humanities
- Integration of material
  - Often from widely different fields
- Team teaching
Some issues to consider

- Idea
- Team-teaching
- Subject
- Learning outcomes
- Scope & sequence
- Breadth & depth
- Organization
- Teaching strategies
Idea

- Genesis may be individual, but often arises through dialogue

- Team develops and implements

- And, a bit on teams since can be a major, initial concern
Team-teaching

- Useful traits of team members:
  - Open to diverse ways of thinking
  - Wary of absolutes
  - Able to admit not knowing
  - Flexible
  - Risk-taking
  - Self-reflective
  - Comfortable with ambiguity
Team-teaching

- Join together
  - Usually for a single course, but
  - Could be for a “cluster” of courses

- Interactions in space & time
  - Serial v Parallel
    - segmented, coordinated, etc.
  - Discussions in class, or not
Team-teaching

- Work together in development
- Integrate perspectives
- Common syllabus
Team-teaching

- Remember that teams evolve through stages:
  - Forming
  - Storming
  - Norming
  - Performing

- While it helps to pick faculty with whom you have already worked (skip some of the stages), you must also

- Be patient, recognize differing skills and points of view

- And… realize that when a team changes constitution, you may have to go through the process again!
Subject

- Expect difficulty & confusion
  - Inventing a “new” subject
- Normal focus on a topic (problem, issue, or theme)
- Initial disciplinary exploration → problems
  - Discipline bound
  - Different points of view (power struggles)
  - Varying assumptions & limitations
- Keep in mind that dealing with these issues is part of the reason for the course → show students
Learning outcomes

- What do you want the students to take with them?
  - Recognize different perspectives
  - Synthesize
  - Think critically
  - Tackle meaningful issues
  - Not constrained by disciplinary boundaries
Learning outcomes

- Recommend using Bloom’s *Taxonomy* (1956) to establish specific learning outcomes:
  - Knowledge
  - Comprehension
  - Application
  - Analysis
  - Synthesis
  - Evaluation
Scope & sequence

- **Scope →** What are the boundaries for the course material?
  - Develop through dialogue

- **Sequence →** In what order will the material be presented?
  - Chronological may not be appropriate
  - Is there an inner logic?
Breadth & depth

- Debates often ensue about “inch deep-mile wide” coverage
  - Recognize impossibility of covering each of the disciplinary areas
- Something will have to be left out!
- Can depth be obtained elsewise?
  - Reports, exams, projects, visits?
- Think re 100% of 10% v 10% of 100%
Organization

- Who will teach?
- When & where will it be offered?
- Credits?
- Assigned v recommended texts?
- TAs?
- FTE assigned to department, or not?

- Some of these issues will be deal-breakers.
  - Unfortunately!
Teaching strategies

- Lots of choices. Expect differences among team members.
  - Training & coaching
  - Lecturing & explaining
  - Inquiry & discovery
  - Groups & teams
  - Experience & reflection

- Combinations are often possible, useful, and exciting

- Stretch your own boundaries. Learn something new!
- Background
- Defining interdisciplinary
- What’s needed for interdisciplinary to work?
- **Why interdisciplinary?**
- Examples
One way of stimulating research inquiry and teaching innovation is through the establishment of high quality interdisciplinary academic programs. These interdisciplinary programs could facilitate collaborative research, enhance collaborative core units, promote faculty participation from various departments, encourage joint appointments, and establish training of students by an interdisciplinary faculty...
Urged the University to:
- promote new interdisciplinary programs
- encourage all Howard students to conduct research

Further noted that as the University moves forward in the new millennium, more interdisciplinary work at both the undergraduate and graduate levels is needed.
Curricular approaches to organizing knowledge

- Discipline-based
- Competency-based
  - Skills-based, professionally-oriented
- Great Books
  - Accumulated wisdom, St. John’s College
- Student-centered
  - Students choose, Evergreen College
- Problem-centered
  - Explore contemporary issues, UC Santa Cruz
Why interdisciplinary?

- Disciplinary constraints
  - More and more about less and less.
- Disciplines are isolated from one another
  - By jargon, assumptions, perspectives
- Disciplines tend to absolutize
  - When you have only a hammer, it becomes the tool by which everything gets fixed
- Disciplinary perspective downplays broader, complex and holistic issues
  - Too reductive to be effective
- Disciplines trivialize
  - They lose sight of both the big and the little picture
Why interdisciplinary?

- New perspectives
- New insights
- Better understanding
- Education is no longer about transmitting information, but about enabling students to use the plethora of information in meaningful and effective ways
- And ultimately, to better prepare our students
- Background
  - Pre (preparation and pre-interdisciplinary)
  - Research
  - Teaching
- What is interdisciplinary?
- What’s needed for interdisciplinary to work?
- Why interdisciplinary?
- Examples
Science & Public Policy

- With Dr. Joseph McCormick, Political Science
- Worked together on a COAS Committee ~1988
- Initial discussions began over lunch ~1990
- S&PP first offered in Spring 1994
Issues

- How to teach
  - Serial v parallel
  - Interactions: class, students, etc.
- Learning a new language and methodology
  - Natural v Social Science
- Adapting to one another
  - Style differences
    - Off-the cuff v deliberative style
  - Syllabus format
- How to list
  - BIOL204 and POLS139
Environmental Studies

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Developed to fulfill ‘new’ interdisciplinary foundational requirement

First offered ~Fall 2001
Issues

- How to teach
  - Serial v parallel (not 2, but 4!)
  - Interactions: class, students, etc.

- Learning new languages and methodologies
  - Natural v Social Science v Humanities

- Adapting to one another
  - Style differences
  - Syllabus format

- How to list
  - Jointly v independently in each department
  - Independently (subject to review re major credit BIOL802)
Introduction to Interdisciplinary Research

- The Katrina course- FRSM100
  - Dr. Gregory Jenkins
    - Physics
  - Dr. George Middendorf
    - Biology
- Writing for Research- ENGL003
  - Dr. Marlena Bremseth
  - Dr. TP Mahadevan
  - Dr. Pat Noone
Issues

- How to teach
  - Serial v parallel
  - Inter- v multi-disciplinary
  - Interactions: class, students, etc.

- Learning a new language and methodology
  - Natural v Natural Science

- Adapting to one another
  - Style differences
    - Invited speakers – 16!
  - Syllabus format

- How to list
  - FRSM100 linked with ENGL003 sections
Background to the course

- Katrina impacts New Orleans - August 29th 2005
- HU faculty begin discussing a symposium in response to Hurricane Katrina.
- ~400 students at Howard University impacted (directly or indirectly) by Katrina
- October 19th 2005 - Katrina Multidisciplinary Symposium on HU campus
  - NCEP/NASA and other participants
- Spring 2006 - 1st Alternative Spring Break
Background

■ Summer/fall 2006
  - Katrina course designed
  - Funded as pilot course by Mellon Foundation

■ Spring 2007
  - Katrina course taught
FRSM 100 - Introduction to Interdisciplinary Research

- Looking for students who were interested in research
- Looking for students who were interested in understanding the events around Katrina
- 2nd semester Freshmen taking English 003 (writing for Research)
- 6 credit course (FRSM 100 and ENG 003)
- Held class size to 40-50 students
COURSE DESCRIPTION

- Undergraduate, freshman-level course
- Designed to equip students to understand not only how research works, but the context in which it is produced and used
- Adopting a variety of interdisciplinary approaches
- Instructors will work with the students to examine the process and methodology of research, including methods used in the design, analysis and interpretation of experiments
Hurricane Katrina was the focus of this course
Examined a variety of aspects, including:
- How and why Katrina had such an impact
- Environmental, legal, economic, sociological, and demographic processes associated with decision-making before, during, and after August 2005
Goals of FRSM 100

The course will provide opportunities for students to fulfill three goals:

1. engage in interdisciplinary ways of thinking about research
2. become self-directed life-long learners
3. conduct, write about, and present research
Required reading


Class Format

- Two 80 minute classes per week
- One lecture per week
- One lecture devoted to research activities
  - Blogs, literature search, group activities
Speakers and topics

1. **Lecture**: Geomorphology of the Mississippi River drainage and the flora & fauna of Southern Louisiana (HU - Biology)

2. **Lecture**: Ethics and decision-making (HU - Engineering)

3. **Lecture**: How History Made Hurricane Katrina (HU - History)

4. **Lecture**: The physics of hurricane formation, movement and damage (HU - Physics)
Speakers and topics

6. **Lecture:** Economic Questions Regarding Recovery and Renovation After Hurricane Katrina (HU - Economics)

7. **Lecture:** Vulnerability to disaster using economic, social, physical data and GIS (HU - Economics)

8. **Lecture:** Interdisciplinary approach used in Afro-American Studies (HU - AA-Studies)

9. **Lecture:** The use of the media in developing projects (HU - Fine Arts)
Speakers and topics

10. **Lecture:** Psychological Consequences of the Hurricane Katrina Experience (HU - School of Social Work)

11. **Lecture:** Katrina as a stressor: Thinking and writing about the human cost (HU - Psychology)

12. **Lecture:** The politics of Hurricane Katrina (HU - Political Science)
Speakers and topics

13. **Lecture:** Public Health in New Orleans (V. Franklin, MD, MPH Director Clinical Services and Employee Health City of New Orleans Health Department)

14. **Lecture:** The Katrina event: a view from a FEMA employee/consultant
Student projects

- The “Eyes” of Katrina: How the media portrayal of Hurricane Katrina affected FEMA and Congress’s response
- The emotional and psychological effects on adolescent youth due to Hurricane Katrina (student from NOLA)
- Rebuilding Louisiana’s Coastline.
- The Building of the Levees: A Question of Unethical Engineering
Student projects

- New Orleans: Race, Riches and Risk
- The “New” New Orleans examining the role of disaster capitalism in New Orleans rebuilding efforts
- Global warming and its effects on coastal cities
- One year later: Hip-hop’s response to Hurricane Katrinas
Student projects

- Hurricane Katrina: A comparison of the political, social and economic state of New Orleans
- The rise of Crime: Post Hurricane Katrina
- How race affects New Orleans Today
- Media response (to Katrina) and the Public
ENGLISH 003: The ENGL 003 classes will focus on developing an analytical and expository writing skills to complement the interdisciplinary research classes. Reading and writing assignments in the respective ENGL 003 reviews will reflect the theme of the companion FRM 100 research classes. Together these classes will reinforce students’ mastery of the skills necessary for conducting research and communicating results.

FRM 100.01 Interdisciplinary Approach: EXPERIENCING MODERN EXILE: Explore the cultural and social implications of both voluntary and/or forced exile through examination of recent historical events. Satisfies Division A, B or C.
FACULTY TEAM: Dr. Darony Damarahlohe, Modern Languages and Literature; Dr. Channing King, Sociology; Ms. Stephanie Robinson, English.
Register for FRM 100.01 CRN: 17925 and ENGL 003 CRN: 10500.003.30 or 10500.003.75.

FRM 100.02 Interdisciplinary Approach: FOOD: Understand food and the contexts in which it is produced, processed, and consumed. Satisfies Division A, B, C or D.
FACULTY TEAM: Dr. Michael Bokas, Sociology; Dr. Rebecca Brown, Sociology; Mr. Norman Tight, English.
Register for FRM 100.01 CRN: 17925 and ENGL 003 CRN: 10477.003.30 or 10482.003.85.

MAKE A DIFFERENCE THROUGH RESEARCH
Earn 6 Credits, Develop Writing Skills, Combine Internship with Civic Engagement.

FRM 100.03 Interdisciplinary Approach: CHINA IN AFRICA: Understand the influence of China in Africa and its implications for the growth and development of Africa and its people. Satisfies Division A, B or C.
FACULTY TEAM: Dr. Simon Africa, African Studies; Dr. Jill McGowan, Mathematics; Mr. Edward Preston, English.
Register for FRM 100.01 CRN: 17925 and ENGL 003 CRN: 10469.003.40 or 10467.003.25.

Sign-up via BisonWeb During Spring 2008 Registration October 29-November 6

For complete course descriptions: www provost howard edu/FHSResearch

For additional information contact:
Dr. Barbara Griffin
Associate Dean
College of Arts and Sciences
202-806-5700

NEW INTERDISCIPLINARY RESEARCH COURSES AND COMPANION ENGLISH 003 COURSES
Introduction to Interdisciplinary Research

- FOOD
  - Dr. George Middendorf
    - Biology
  - Dr. Rebecca Reviere
    - Sociology

- Writing for Research-ENGL003
  - Dr. Nicole Taylor
Goals of FRSM 100

The course will provide opportunities for students to fulfill three goals:

1. engage in interdisciplinary ways of thinking about research
2. become self-directed life-long learners
3. conduct, write about, and present research
Focus on food

- Biological aspects
  - Taste, digestion, conversion, etc.
- Historical & geographical aspects
- Health aspects
- Sociological aspects
- Environmental aspects
  - Production, consumption, etc.