

# Lunchtime Brown Bag Discussions in Education

Summary Fall '03

The Brown Bag Discussions in Education are a forum for regular informal for examining departmental practices and concerns in education.

## Objectives

- provide a forum for faculty (staff and students) to discuss education
- raise awareness among the participants of local and national educational practices / reforms
- identify areas of concern, reform, attention in education
- create networks of faculty addressing / teaching common material
- bring in outside speakers for seminar style (rather than colloquium) style interaction

## Description

The Fall '03 program approached these goals by having bi-weekly meetings surrounding one of two themes:

- i) review of the undergraduate course sequence
- ii) bringing in outside speakers who would be of common interest but different perspective

### i) Review of undergraduate program:

- invite (1-4) senior faculty to lead discussion on the a particular course or sequence
- address goals, methods, concerns, purpose and curriculum of these courses
- after 20-30min of structured presentation, open forum discussion for approx. 1 hour
- often raise topics to be revisited in future brown bags
- notes taken and often audio-taped
- initially only open to faculty; then , more broadly

### ii) External speakers

- nationally recognized speakers (either established or up- and coming-)
- report on successful reforms / research studies in education
- open broadly to public
- often co-sponsored.

## Topical Summary

9/10 - Organization review of summer projects (S Pollock, Dan D, Chuck R., P Beale, S Robertson, A Hasenfratz)

9/17 - David Hammer (U Maryland) - epistemology in physics

10/1 - 2140 - Leo R., Mihaly H. (Mathematical Phys)

10/22: John T, Jim S., Anna H. - mechanics 3210 (and 2140)

10/29 - Sue Rosser (Georgia Tech) - 20 strategies to improve teaching (and inclusion)

11/13- Tom D., Bill F, Jim S. - quantum and modern (2170, 3220, 4410)

12/3- Arun Bansil (NorthEastern Unviersity) - Elmo - Embedded Learning Modules

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## Plans for Spring '04:

- continued course discussion, e.g. honors sequence, E/M, Q/M continued
- visitors: Elaine S. / E&ER, Ron Thorton (Tufts), and another PER

## Evaluation:

By the numbers / attendance:

9/10 - 12: 10 phys faculty / 2 staff/grads/others

9/17 - 19: 9 phys faculty / 9 staff / grad /others (3 diff depts.)

10/1 - 16: 14 phy faculty / 2 staff grad others

10/22-16: 14 faculty / 2 sgo

10/29- 30: 13 faculty / 16 deans, staff, grads, others

11/13- 18: 13 phys faculty / 5 s-g-o

12/3- 19: 10 phys faculty / 9 others

At least 25 different faculty from the physics department attended the brown bag sessions. Significant interest from other departments (APS, Engineering, Math) in various programs, particularly the visiting speakers.. Synergistic with: physics education research group, STEM-TP, and departmental reforms.

## ***9/10 - Organization review of summer projects / current programs***

We will spend time organizing for the coming term, summarizing summer activities and some of the current education initiatives running in the department.

Paul B - concept tests -- currently continuing

Chuck R - linking these to lecture demonstrations (some done, links TBD)

Ed K- prep for SCALE UP. He'll move from 100 person class to 30. Technology is apparently easy

Steve P - dvmt of grad training program

Dan D- new class of labs for seniors (did not finish, or get equip working)

Anna H- compile mathematica notebook page for bunch of numerical methods courses (problem is that fac. have to have mathematica).

Scott R- phys 1140 lab redesign based on his interests.

Noah F. - organizational discussion of organization / accessibility of educational reforms

Kathy Perkins gave a nice summary of PhET: <http://www.colorado.edu/physics/phet>

## ***9/17 - David Hammer (U Maryland) - epistemology in physics***

Title: "What do the students need?"

The instruction we offer students, at any level, presumably reflects what we believe will help them understand physics. Physics instructors do not typically subject their beliefs to scrutiny, working instead from common sense assumptions about what students need—clear explanations, demonstrations, motivation and practice. As in physics, however, common sense ideas (e.g.

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'objects move because they are pushed') aren't always correct. This talk will present evidence that the usual assumptions are insufficient and offer an expanded set of possibilities.

An associated paper that may be of interest:

<http://www2.physics.umd.edu/~davidham/studentresources.html>

## 10/1 - 2140 - Leo R., Mihaly H. (Mathematical Phys)

Some guiding questions for the discussion will be:

- a) the fundamental purpose of this course
- b) how to optimally structure the course - if students are spending time in a voluntary recitation, should this be institutionalized for students to receive credit?
- c) related to each of these, how much can we ask our students to reasonably master in this course?
- d) what mechanisms are most effective (e.g. how is homework structured to effectively engage the students).

Useful items that came up:

- notably the ordering / emphasis (time allotted to) topics was an issue. While KT and Tom Degrand have revised the syllabus to address this (e.g. to move vector calculus to the end of the term so students who see this in Calc 3 won't be repeating material), many faculty were unaware of these changes.
- Allan Franklin is finishing a revised syllabus/ description of all undergraduate courses which reflects these changes
- there was interest in having a broader archiving mechanism of course materials, notes, and approaches to the class.
- several faculty (e.g. Leo R.) noted the utility of running a recitation section in addition to lectures. While this requires extra time of the faculty and students, one approach was to use this to replace one or more of the weekly office hours. It is not possible to institutionalize this by offering an additional credit for the course

## 10/22: John T, Jim S., Anna H. - mechanics 3210 (and 2140)

Analytical Mechanics 3210: (10/22)

- there was a thorough review of the syllabus and strengths and weakness of relevant texts
- concerns about the amount of time necessary to review introductory material (Newtonian mechanics and mathematical tools) and how long it took some texts to introduce Lagrange
- additionally there were concerns about what material was core, and hence what the learning goals of this course were. Examples of this tension included the question of emphasis between (1) mastering applications of CM and (2) broader principles or approaches of physicists (the abstract tools we use in thinking about the domain).
- broad discussion of course sequence in sophomore/jr. year there was some consensus that:
  - some courses need to be better coupled (e.g. Quantum I and II, and possibly 2170)
  - more time could be used in 3210 parallel the E/M and Q/M sequence
  - this might be achieved by coupling 3210 with 2140 into a 2 semester sequence, where the

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math was covered in an applied and physics-centric manner.

General questions that have showed up in these sessions:

- what can we expect students to carry from one course to the next?
- what is the right balance between: (a) application and (b) theory; (a) breadth and (b) depth

## **10/29 - Sue Rosser (Georgia Tech) - 20 strategies to improve teaching (and inclusion)**

\*\*\*\*\* co- sponsored by LEAP

Sue Rosser (Dean of Ivan Allen College, Georgia Institute of Technology) will discuss twenty teaching strategies, which when coupled with a model for including information on gender and race in curricular content, makes science classes and laboratories more female-friendly.

## **11/13- Tom D., Bill F, Jim S. - quantum and modern (2170, 3220, 4410)**

In particular, we will be examining some questions that arose in past meetings:

- what are the relations between 2170 and 3320 ?
- what are the course goals for modern physics ?
- what do we expect students enrolling in / leaving each of these courses to know?

Issue of coordination of 2170, 3220, 4410 (no sequential numbers). Either jr / sr or soph/ jr were thought to be seamless whole... want same person teaching... part of design philosophy.

Questions:

at what level do you teach phenomology  
at what leve should you do spec. relativity.  
do we want to make 2170 different from 2130

## **12/3- Arun Bansil (NorthEastern Unviersity) - Elmo - Embedded Learning Modules**

ELMO Project: A New Paradigm for Teaching Science to Non-science Students

Arun Bansil  
Professor of Physics  
Northeastern University

Northeastern University's ELMO (for Embedded Learning Modules) Project, with major funding from NSF and FIPSE (Education Department), seeks to create learning experiences for naturally integrating scientific principles, concepts and traditions throughout the non-science curricula. The ELMO program is designed to overcome the enormous barriers of fragmented learning and poor motivation in science and technology among non-science students. Specifically, we have

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developed sets of laboratory modules which mesh seamlessly within specific non-science courses so that students can recognize the direct relevance of science and technology to their disciplinary interests. Northeastern University has constructed a dedicated 2000 sq. ft. ELMO Laboratory for design and delivery of the ELMO modules. The first ELMO modules were offered to our Art majors in Fall 2000, and the program now encompasses Art, Music and Theater majors. Faculty and students in these departments have responded enthusiastically to the ELMO courses. We are also developing “flavors” or versions of the modules suited for students and teachers in the K-12 systems; intensive ELMO workshops for in-service Boston area K-12 teachers have been offered since Summer 2002. An extensive ELMO Assessment System (EAS) is under vigorous development for addressing traditional assessment measures and to investigate issues of learning style sensitivities of students where the ELMO Laboratory offers a unique test-bed. Our current partner institutions are: Boston’s Museum of Fine Arts, Boston's Museum of Science, London Science Museum, Boston Symphony Orchestra, The Boston Public Schools, and The Illinois of Institute Technology.