

PHS 594: Advanced Modeling Workshop

Instructor: Kathy Malone
Dates: July 5 – August 2, 2005
Hours: 8:00 – 11:30 AM (MTWTh)
Location: PS H-563
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Syllabus:

- I. Cognition and Instruction
 - a. Review of cognitive issues
 - b. Distributed cognition – guest instructor Colleen Megowan
 - c. Epistemological beliefs and effects on instruction
 - d. Metacognition
 - e. How one helps students develop coherent structure of physics knowledge (i.e., Modeling discourse, etc.)
- II. Instructional Design
 - a. Initial student knowledge states and task analysis
 - b. Instructional solutions
 - c. Assessment
 - d. Revision
- III. Developing an Energy Thread in Physics – guest instructor Gregg Swackhamer
- IV. Learn Anytime Anywhere Physics (LAAPhysics) – guest instructor Mike Turner
 - a. The LAAP project is a collaborative effort to produce an online laboratory learning environment for introductory college level physics.
 - b. With the use of computer software, the student experiences nearly all of the complexities of a laboratory inquiry-based course such as those found on many campuses in the country where pioneering work in Physics Education Research has been conducted.
- V. Developing Communities of practice
 - a. Leadership issues
 - b. Communications of best practice
- VI. Action research and advanced modeling projects

Reading List (articles will be provided for participants. Please download and read the two papers by Gregg Swackhamer and the Hestenes paper before the course begins.)

- Hammer, D. (1994). Epistemological Beliefs in Introductory Physics. *Cognition and Instruction* **12**(2), 151-183.
- Hestenes, D. (1979). Wherefore a science of teaching, *The Physics Teacher* **17**, 235-242. On the web in pdf at <<http://modeling.asu.edu/R&E/Research.html>>
- Klahr, D. Chen Z., and Toth, E. (2001). Cognitive Development and Science Education: Ships that pass in the Night or Beacons of Mutual Illumination?; *Cognition and Instruction: twenty five years of Progress.*
- Klahr, D, and Simon, H. (1999). Studies of Scientific Discovery: Complementary Approaches and Convergent Findings; *Psychological Bulletin* **125**, 524-543.
- Palincsar, A, and Brown, A. (1984). Reciprocal Teaching of Comprehension-fostering and Comprehension-Monitoring Activities. *Cognition and Instruction* **1**(2), 117-175.
- Swackhamer, G. Making Work Work. On the web in pdf at <<http://modeling.asu.edu/modeling-HS.html>>
- Swackhamer, G. Conceptual Resources for Understanding Energy. On the web in pdf at <<http://modeling.asu.edu/Projects-Resources.html>>