

PHYSICS 429.03: Modeling Method of Instruction

June 25 – July 13, 2007

Department of Physics Illinois State University

Catalog Description:

Physics 429.03 *Modeling Method of Instruction*, 6 semester hours credit, summer semester

Workshop designed to outfit in-service physics and physical science teachers with the tools, experiences, and background needed to improve their physics instruction. *Prerequisites:* In-service physics teacher full time teaching position at an Illinois high school. Admission to *Chicago ITQ Science Project*.

NOTE: Physics 429.03 course credit is NOT accepted by any graduate program at Illinois State University for the purpose of earning graduate degrees. While tuition waivers will be provided, there is a substantial extension fee associated with this course credit. See the *Chicago ITQ Science Project* Web site for details.

Instructor:

Name: Carl J. Wenning, Coordinator

Physics Teacher Education Program

Illinois State University Physics Department

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Meeting Days/Times/Location:

The class will meet on Monday through Friday, June 25 – July 14, 2007, from 9:00 a.m. - 4:00 p.m. approximately. Location: Room 263 on the Priory Campus of Dominican University, River Forest, IL. There will be no class meeting on Wednesday, July 4 due to the holiday.

Overview:

Secondary-level physical science teachers will participate in fourteen days of workshop training in the Modeling Method of Instruction. The Modeling Method of instruction has been shown to be a highly effective extension of the traditional 3-step learning cycle (observe, generalize, apply). The modeling cycle addresses the deficiencies of the learning cycle by assisting students to construct understanding from observations, by confronting student preconceptions, by examining student thought processes through the process of “whiteboarding” and Socratic dialoguing. Participants will receive a Modeling Method Handbook, numerous handouts, 10 whiteboards, 10 dry erase marker sets, and 10 Tumbling Buggies with batteries and battery blocks. The workshop will consist of approximately 84 hours of contact time.

Professional Practice Goals:

The goal of this Modeling Method workshop is to provide a meaningful form of professional development for in-service teachers who are inadequately prepared to teach physical science using student-centered, inquiry-based, constructivist practices. Real change in instructional practice will come about only when master teachers demonstrate new ways of teaching, allow less experienced teachers to practice the new method, and then help them to improve their efforts. This workshop will do just that. The principles learned here can be readily transferred to any other sort of classroom instruction. Resources for implementation of Modeling Method in physical science (integrating science, math, and technology) classroom will be provided through this grant and by support from the participant's school district.

Required and Optional Readings:

As specified by course instructor and workshop leaders.

Required Student Tasks:

Students enrolled in PHYSICS 429.03 *Modeling Method of Instruction* will be required to complete the following tasks:

Essays (50% of course grade, 250 normalized points, 50 each)

Students will write five (5) 2-to 3-page (1-inch borders, double spaced, 12 point Times font) essays that reflect their understanding of the following topics:

- Identifying, confronting, and resolving student misconceptions
- Implementing Socratic questioning
- Teaching the nature of science
- The role of climate setting
- Student metacognition and self regulation

Each essay will be scored using a rubric. Details will be provided online through the Chicago ITQ Science Project Web page.

Daily Journaling (10% of course grade, 50 normalized points)

Registered PHYSICS 429.03 students will be provided with a notebook for recording experiences, insights, reminders, and reflections on the subject matter of the workshop. These journals will be examined each day and judged on a 3-point basis: “3-strong, 2-weak, 1-unacceptable, 0missing.” Written commentary will be provided by workshop mentors for improving daily reflections if found weak or unacceptable.

Content Tests (30% of course grade, 150 normalized points)

Registered PHYSICS 429.03 students will take the FCI (90 normalized points) and TUG-K2 (60 normalized points) pre- and posttests. Earned scores on the posttest count toward the course grade.

Participation (10% of course grade, 50 normalized points)

Participation will be judged on the basis of daily attendance, active participation being assumed. Half-time participation will result in a 50% of all available participation points, unless arrangements are made in advance for missed contact hours.

Course Grade:

Grades will be determined on the basis of the following scale:

- [90% -100%] of all 500 normalized points = A
- [80% -90%) of all 500 normalized points = B
- [70% -80%) of all 500 normalized points = C
- [65% -70%) of all 500 normalized points = D
- [0% -65%) of all 500 normalized points = F

Due Dates:

FINALIZED ESSAYS MUST BE RECEIVED NO LATER THAN FRIDAY, AUGUST 3rd. (Send 5 days in advance of this date to: Carl J. Wenning, 4560 Physics Department, Illinois State University, Normal, IL 61790-4560) OR E-MAILED NO LATER THAN AUGUST 3rd (Send to: cwenning@ilstu.edu) IN ORDER FOR THE GRADE TO BE TURN-IN ON TIME. You may send *electronic* draft copies for review if you like. I'll be happy to provide written suggestions for improvement. Please give me at least 2 days of turn around time. Please only send MSWord (.doc) or RTF files.

Course Policies:

- JOURNALS MUST BE TURNED IN AT THE END OF EACH DAY.
- CONTENT TESTS WILL BE CONDUCTED ON THE LAST DAY OF THE WORKSHOP.
- PARTICIPATION WILL BE ASSESSED DAILY USING ATTENDANCE RECORDS.