Methods and Techniques: Science  
TEACH ED 358  
Spring 2004  
Wednesdays 4:30 p.m.-7:00 p.m.

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Course Description:  
This course is designed to provide pre-service teachers with skills and experiences that will transform them from being students and scientists into being middle school and high school science teachers. You will:

• explore discussion and questioning techniques to uncover students’ prior knowledge  
• adapt lessons and design curriculum based on the needs of your students  
• interpret relevant research findings and apply them to your instructional strategies  
• experiment with a variety of pedagogical strategies, including genuine inquiry and problem-based instruction  
• become familiar with alternative assessments and looking at student work  
• consider the organization and management of a hands-on science classroom  
• reflect and learn from your own teaching experiences and observations

Course Requirements:

1. Reaction papers Prior to class each week, students will complete the assigned readings and write a brief reaction paper. Identify a critical theme and discuss the implications for you as a “good” teacher. You may disagree with some or all of the authors underlying assumptions and conclusions. Reaction papers should be e-mailed to all members of the class by 4 p.m. on the Tuesday before class.

2. Written assignments Each week students will complete a written assignment that addresses a particular pedagogical strategy or curriculum adaptation observed in the classroom.

3. Mini-teaching All students will complete three mini-teaching lessons during the course. The lessons will address a specific a teaching strategy, be 10-15 minutes long on any topic appropriate to middle school or high school science.

4. Attendance Weekly attendance is expected.

5. Participation Among a teacher’s greatest tools are shared experiences, honest feedback from peers, and the opportunity to reflect. Willingness to participate is a must!

**Week 1-March 31 Introduction/ Pedagogical Content Knowledge** (NU framework 3.1)  
**Readings:**


Wilson, Suzanne M., Shuman, Lee S., Richert, Anna E. 150 Different ways of knowing: representations of knowledge in teaching. In *Exploring Teachers’ Thinking* (1987; Mansell)


**Assignments:**

1. **Reaction** to Shulman’s “table of learning.” Is it realistic, usable, and meaningful? Thinking back on your experience with the I, Bio curriculum does this table apply? Describe how citing specific examples.

2. **Look up** the Illinois state goals that are specific to your subject (biology, chemistry, physics). With these goals in mind (11,12,13) choose a topic that will become the basis of your lesson plan portfolio and final project.

3. **Observe** your classroom teacher. Do you see evidence of PCK as described by Shulman et. al.? Describe each event. Were there other events where you thought PCK needed to be improved? How and why?

**Week 2-April 7 Working With Student Ideas** (NU framework 1.1)  
**Readings:**


Assignments:
1. **Reaction** to the readings. Do these articles reinforce with what you learned about “working with student ideas” in I, Bio? Explain.
2. **Observation**: Do you see evidence of your classroom teacher working with student ideas? Describe some scenarios.

**Week 3-April 14 Inquiry-Based Science Teaching and Learning** (NU framework 1.3, 1.4, 1.5, 2.1)

**Readings:**

**Assignments:**
1. **Reaction** paper. Based on what you have read, what do you think “inquiry” means in a real high school classroom. How will it look in your classroom?
2. **Mini-teaching.** Choose a demonstration or “canned” lab that is appropriate to your chosen topic. Using the articles as inspiration, extend the “hands-on activity or lab into a genuine inquiry activity. Make sure your chosen activity is age-specific. Provide a copy of the original activity or lab; include your rewrite and a rationale for the changes you made.

**Week 4-April 21 Cooperative Learning strategies** (NU framework 1.3, 1.4, 2.1, 3.1)

**Readings:**

**Assignments:**
1. **Reaction** paper. Respond to the Felder paper. Do you perceive other problems that are not mentioned in the reading? Do the authors’ suggestions lessen your concerns?
2. **Observe** a cooperative learning activity in your classroom. Describe the strategy the teacher used, i.e. how were groups chosen, what role did each member play in the group, what was the intended outcome. Did the teacher have a specific goal in mind? How did the teacher assess whether learning occurred?

**Week 5-April 28 Assessments/Looking at Student Work** (NU framework 1.1, 1.4, 3.1)

**Readings:**


**Assignment:**
1. **Design** an alternative assessment that you will use in your lesson plan. Decide what you want to learn from the assessment, choose an alternative assessment that provides this feedback, is consistent with your teaching style and can be easily implemented in your class. Include a rubric. Be prepared to share. Consider the likely results and decide what changes of any you could make. We will fashion a rubric in class.

2. Considering your lesson topic complete the *design framework*.

**Week 6-May 5 Curricular design/Putting the whole thing together** (NU framework all)

**Readings:**


**Assignment**
1. **Construct and apply** using the key point of the design framework as a guide.

**Week 7- Managing the Inquiry Science Classroom** (NU framework 1.4, 3.1, 3.2)

**Readings:**


Assignment:
1. Prepare a first draft of your lesson plan.
2. Observe some aspect of classroom management that you admire and will adopt. Notice problems and suggest how you might do things differently based on the readings (or not).

Week 8-May 19 The Multicultural Classroom (NU framework 1.1, 1.3, 1.4, 3.1, 3.2)
Readings:


Assignment:
This week notice the ethnicity of the kids in you classroom. Are there cultural differences among various groups that require special accommodations? Does the classroom teacher regard ethnic diversity in her/his communication of lessons, assignments and activities? Is there a sense of fairness and equity in the classroom?

Week 9-May 26 Managing Teacher Stress (NU framework 1.2, 3.2)
Readings:

Assignment:
Continue work on lesson plan. Due next week.

Week 10-June 2 Design Practice and Reflection (NU framework all)
Reading:

Assignment: Final Project due.