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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!

6. Final Project.
Week 1-March 29 Introduction/ Standards and Goals (NU framework 3.1)
In Class Readings:
Northwestern University Conceptual Framework

Illinois Professional Teaching Standards
Language Arts Standards for All Illinois Teachers
Technology Standards for All Illinois Teachers


Assignments:
1. **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.
2. **Read:**
   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)
3. **Observe** your classroom teacher. Do you see evidence of PCK as described in the readings? Describe each event. Were there other events where you thought PCK needed to be improved? How and why?

Week 2-April 4 Classroom strategies for uncovering student conceptions (NU conceptual framework 1.1)
Readings:


Assignments:
1. **Reaction** to the readings. What impact do student ideas have on teaching for meaningful understanding?
2. **Observation:** Do you see evidence of your classroom teacher working with student ideas? Describe some scenarios.
Week 3-April 11 Inquiry-based teacher practices (NU conceptual 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, convert the demonstration or lab into a genuine inquiry activity. Make sure your chosen activity is age-specific. Provide the original lab or demonstration, include your rewrite and the justifications for the changes you made. Be prepared to defend your plan.

Week 4-April 18 Cooperative Learning strategies (NU framework 1.3, 1.4, 2.1, 3.1)
Readings:
Felder, Richard, M., Brent, Rebecca (1996). Navigating the bumpy road to student-centered instruction. In College Teaching 44(2), 43-47.
Assignments:
1. Reaction paper. Respond to the Felder paper. Do you perceive other potential problems that are not mentioned in the reading? Do the authors’ suggestions lesson you concerns about student resistance you might encounter in your own classroom.

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 25 Alternative Assessments/Looking at Student Work (NU framework 1.1, 1.4, 3.1)

Readings:


Assignment:
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.

Week 6-May 2 Curricular design/putting the whole thing together (NU framework- all)

Readings:


Assignment:
1. Reaction: Based on what you have read in the articles what do you think are the biggest challenges of project-based curricula? Does one of these styles—design, case study, or LfU seem more doable? Why? Are you beginning to see yourself doing some or any of these projects?

2. Bring in student artifacts from an activity or assignment done in your classroom. Write a brief summary of the activity. Include the topic being taught and the goal of the activity. Indicate how the student work shows evidence of student learning, or evidence of continued misconceptions.
Week 7-May 9 Managing the Inquiry Science Classroom (NU framework 1.4, 3.1, 3.2)

Readings:


Assignment:
First draft of lesson plan project.

Week 8-May 16 The multicultural classroom (NU framework 1.1, 1.3, 1.4, 3.1, 3.2)
Readings:


Assignment:
1. Use the chart from the “continuum” to notice how kids in your classroom fall into groups. Are there cultural differences among various groups that require special accommodations? What about socioeconomic differences? Religious differences? Gender differences? Does the classroom teacher consider diversity in her/his communication of lessons, assignments and activities? Is there a sense of fairness and equity in the classroom?
2. In your lesson plan indicate strategies you will use to encourage all groups to participate.

Week 9-May 23 Design, practice and reflection (NU framework-all)
Presentation of Lesson Portfolios. (NU framework 1.2, 3.2)

Readings:


School Conditions and the Training of Thought. From How We Think: A Restatement of the Relation of Reflective Thinking to the Educative Process, 1933.
School of Education and Social Policy Academic Integrity Statement

Students in this course are expected to comply with the policies found in the booklet, "Academic Integrity at Northwestern University: A Basic guide". All papers submitted for credit in this course must be sent as email attachments as well as delivered in printed form. Your written work may be electronically tested for plagiarized content. For details regarding academic integrity at Northwestern, visit: http://www.northwestern.edu/uacc/. If you need a copy of the brochure visit the SESP Student Affairs Office.