**Loyola University Chicago**
**School of Education**

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**CIEP M83: Teaching Science in Elementary/Middle School**
**Fall 2008**
**Mondays, 11:30-2:00 p.m., LSB 116**

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"The whole of science is nothing more than a refinement of everyday thinking."
--Albert Einstein, 1936

## COURSE OVERVIEW, OBJECTIVES, AND STANDARDS

### COURSE OVERVIEW AND OBJECTIVES

This course is designed to engage elementary and middle school pre-service teachers with issues, challenges, and opportunities associated with science learning and teaching. Through course readings, discussions, and assignments, we will explore issues relevant to elementary and middle school science teaching (and science teaching in general), such as teaching science in ways that model scientific practice, linking science and other disciplines (e.g., literacy, social studies), teaching science for social justice, and connecting science learning and teaching to youth's lives. We will have ample opportunities to plan instruction and assessment opportunities, practice instructional and assessment techniques, and grapple with a host of challenges that elementary and middle school teachers face.

Course objectives include (listed in no particular order):
1. Students will explain what various stakeholders believe science education should be and then interrogate those perspectives in order to grapple with questions related to what youth should actually be doing in school science.
2. Students will reflect on various aspects of what we know about how people learn and then design and revise instructional and assessment materials that embody some of that research.
3. Students will reflect on what it means to teach science for social justice and then design and revise instructional and assessment materials that engage ALL youth.
4. Students will consider how science learning and teaching can and should interact with aspects of youth culture by interviewing youth and reflecting on the data's significance for teaching science.

### COURSE STANDARDS

This course is aligned to the following standards:
1. Loyola University of Chicago – School of Education – Conceptual Framework (CF) standards
    a. CF 1: Candidates demonstrate an understanding of a current body of literature and are able to critically evaluate new practices and research in their field.

b. CF 5: Candidates demonstrate technological knowledge and skills that enhance education.

2. The Association for Childhood Education International (ACEI) and The National Council for the Accreditation of Teacher Education (NCATE) standards

a. 2.2: *Science*: Candidates know, understand, and use fundamental concepts in the subject matter of science—including physical, life, and earth and space sciences—as well as concepts in science and technology, science in personal and social perspectives, the history and nature of science, the unifying concepts of science, and the inquiry processes scientists use in discovery of new knowledge to build a base for scientific and technological literacy.

b. 3.1: *Integrating and applying knowledge for instruction*: Candidates plan and implement instruction based on knowledge of students, learning theory, subject matter, curricular goals, and community.

c. 3.2: *Adaptation to diverse students*: Candidates understand how elementary students differ in their development and approaches to learning, and create instructional opportunities that are adapted to diverse students.

d. 3.3: *Development of critical thinking, problem solving and performance skills*: Candidates understand and use a variety of teaching strategies that encourage elementary students' development of critical thinking, problem solving, and performance skills.

e. 3.4: *Active engagement in learning*: Candidates use their knowledge and understanding of individual and group motivation and behavior among students at the K-6 level to foster active engagement in learning, self motivation, and positive social interaction and to create supportive learning environments.

f. 3.5: *Communication to foster learning*: Candidates use their knowledge and understanding of effective verbal, nonverbal, and media communication techniques to foster active inquiry, collaboration, and supportive interaction in the elementary classroom.

## CONCEPTUAL FRAMEWORK

This course embodies the conceptual framework – *Professionalism in Service of Social Justice* – of the School of Education (SOE) at Loyola University Chicago. The four components of the SOE's conceptual framework are *service*, *skills*, *knowledge*, and *ethics*. Teaching and service go hand and hand because teaching is one answer to the following question: How does my action serve others? It is my stance that as educators, we are in the business of serving the youth in our classrooms, their families, and our communities – local and global. Teaching is an ethical act and science teaching is no exception. We will explore what it means to be an ethical teacher in the context of science learning and teaching. With respect to skills and knowledge, we will also explore current best practices in science education and some of the research undergirding those practices in an attempt to interrogate those practices in light of authentic scientific practice, social justice, and youth culture. This is all in service of becoming a community of practitioners who are committed to serving youth, their families, and our communities and committed to studying our own practice in order to continue to reflect on our teaching.

## COURSE TEXTS AND MATERIALS

1. Michaels, S., Shouse, A.W., & Schweingruber, H.A., (2008). *Ready, set, science! Putting research to work in K-8 science classrooms*. Washington, DC: National Academies Press. (available at the LSB bookstore)
2. American Association for the Advancement of Science/Project 2061. (1989). *Science for*

*all Americans*. New York, NY: Oxford University Press. (available online) http://www.project2061.org/publications/sfaa/default.htm

3. American Association for the Advancement of Science/Project 2061. (1993). *Benchmarks for science literacy*. New York, NY: Oxford University Press. (available online) http://www.project2061.org/publications/bsl/default.htm
4. National Research Council. (1996). *National science education standards.* Washington, DC: National Academy Press. (available online) http://www.nap.edu/html/nses
5. Illinois State Board of Education (2003). *Illinois Learning Standards*. Springfield, IL: ISBE. (available online) http://www.isbe.state.il.us/ils/science/standards.htm
6. Additional handouts and readings will be posted to Blackboard throughout the course.

## COURSE POLICIES

### COURSE EVALUATION

Grades are based on total points earned. No curve is used. The course grading scale is as follows:

| **Percent Range** | **Corresponding Grade** |
|---|---|
| 93% - 100% | A |
| 90% - 92% | A- |
| 87% - 89% | B+ |
| 83% - 86% | B |
| 80% - 82% | B- |
| 77% - 79% | C+ |
| 73% - 76% | C |
| 70% - 72% | C- |
| 67% - 69% | D+ |
| 63% - 66% | D |
| 60% - 62% | D- |
| Below 60% | F |

NOTE: See "Course Assignments and Projects" for a list of course assignments and the points they are worth.

### ADDITIONAL POLICIES AND EXPECTATIONS

1. **Academic Honesty**

Academic honesty is an expression of interpersonal justice, responsibility and care, applicable to Loyola University faculty, students, and staff, which demands that the pursuit of knowledge in the university community be carried out with sincerity and integrity. Academic dishonesty is one of several possible reasons why a student may be dismissed from the Graduate School of Education. For specific policies and procedures see:
http://www.luc.edu/education/academics_policies.shtml#honesty

The same standards apply to undergraduate education. For specific policies and procedures see:
http://www.luc.edu/academics/catalog/undergrad/reg_academicintegrity.shtml

2. **Accessibility**
Students who have disabilities, which they believe entitle them to accommodations under the Americans with Disabilities Act, should register with the Services for Students with Disabilities (SSWD) office. To request accommodations, students must schedule an appointment with an SSWD coordinator. Students should contact SSWD at least four weeks before their first semester or term at Loyola. Returning students should schedule an appointment within the first two weeks of the semester or term. The University policy on accommodations and participation in courses is available at: http://www.luc.edu/sswd

3. **Harassment**
It is unacceptable and a violation of university policy to harass, discriminate against or abuse any person because of his or her race, color, national origin, gender, sexual orientation, disability, religion, age or any other characteristic protected by applicable law. Such behavior threatens to destroy the environment of tolerance and mutual respect that must prevail for this university to fulfill its educational and health care mission. For this reason, every incident of harassment, discrimination or abuse undermines the aspirations and attacks the ideals of our community. For specific definitions of discrimination, abuse, and harassment refer p. 25-26 in the Loyola University Chicago Student Handbook, located at:
http://www.luc.edu/studentaffairs/pdfs/LoyolaStudentHandbook2006.pdf

If you believe you are subject to such harassment, you should notify your instructor. If you believe you are subject to harassment by your instructor, contact the Associate Dean of Academic Affairs at 312-915-6464.

4. **Diversity**
It is my intention to facilitate this course in ways that acknowledge and respect all aspects of diversity. This includes respect for treatment of ideas and practices related to gender, sexuality, disability, age, socio-economic status, race, ethnicity, and culture. Not only must we have respect for each other relative to diversity but we must also spend time thinking about how issues of diversity interact with science learning and teaching in K-8 science classrooms. We will spend time discussing what it means to promote science education for ALL students.

5. **Classroom Community**
Our work together relies on honest, open, and respectful dialogue so that all participants feel free to express their views. Here are a few guidelines to help facilitate our conversations and activities each week:

a. *There is no such thing as a stupid question*. Please ask any and all questions that you have and remember that by asking your questions, you are allowing us to learn as a community because you are helping to make ideas visible.

b. *Be respectful of others' ideas and experiences* even if they are different from your own. We do not have to agree but we do owe it to each other to listen to and consider each other's points of view. On a related note, please *respect confidentiality* both in the class and outside of it.

c. *Listen to others* by trying not to interrupt until whoever is talking finishes and by trying not to pass judgment until you have heard and considered what others have said. Do not assume that silences are unproductive. Give others time to think, consider, and formulate ideas.

d. *Monitor your participation*. If you are outgoing and tend to dominate conversation, use this course to practice allowing others a space to participate. If you are less outgoing and tend to let others do the talking, use this course as an opportunity to practice speaking up. It is always helpful to ask others what they think in any given situation.
e. *Please either turn cell phones off or to vibrate* before each class session out of respect for our community. On a related note, *use laptops appropriately* (e.g., for full engagement in course activities, assignments, and discussions, vs. for IMing friends, looking at unrelated web sites, doing homework/assignments for another course). Please *turn off all MP3 players*.

6. **Attendance and Participation**
Regular, on-time attendance and thoughtful participation during class discussions and other activities are essential not only to your individual performance but also to the success of the course. Collaboration in every phase of the course is absolutely necessary if we are to form a learning and teaching community. We all share responsibility for the learning and teaching in this course and beyond. Because you will not be able to participate in the class community if you are not present, excessive absences will result in you receiving a lower grade in the course, except in the case of extreme circumstances (e.g., family emergency, illness). If you know that you have to miss a class session, please notify me *prior* to your absence. For any missed class session, you will be required to write a summary of the readings for that session, as well as your reflections on them.

7. **Late Work and Extension Requests**
I will not accept any late work. In the event of extreme circumstances (e.g., family emergency, illness), I can be reasonable about deadlines and extensions. You can contact me via email or phone. *If at all possible, please make sure you contact me prior to any given due date*.

8. **Format for Assignments**
Unless otherwise noted, all assignments must be typed, double-spaced, with one-inch margins and 12 point Times New Roman font. If referencing course or other materials, please follow American Psychological Association style guidelines (APA – 5$^{th}$ edition). You can access the APA style manual through Loyola University Chicago's libraries or online at http://www.apastyle.org.

9. **Technology**
It is important that we spend time thinking about how to integrate technology into science learning and teaching. Various forms of technology are crucial to many aspects of scientific work (e.g., instrumentation, analyses) and therefore, youth should have the opportunity to engage with appropriate technology, used for specific purposes, when learning science. Furthermore, technology is arguably a significant part of youth culture – youth are used to learning with it and learning from it. As educators, we need to use that to our advantage when applicable and to that end, we will discuss and practice how to effectively utilize technology in science learning and teaching.

COURSE ASSIGNMENTS AND PROJECTS
NOTE: More information (i.e., detailed assignments with rubrics when applicable) will be posted on Blackboard in a timely fashion.

1. **Participation** – *50 points – earned throughout the course*
As noted above, you are expected to participate in all aspects of this course. Part of your participation points will come from your participation in a discussion forum on Blackboard. Each week, by 9:00 p.m. the night before class (i.e., Sunday evenings by 9:00 p.m.), you will be responsible for posing at least one question about the group of readings for the week *and* at least one response to one of the questions your classmates have posed. You will earn one point for posing at least one question and one point for responding to at least one question (no extra points will be given for posing and/or responding to more than one question). Furthermore, you will earn an additional two points in class each week by actively participating *twice* during class (e.g., reflecting on an argument made in a reading, making a claim relative to the readings or in-class discussion/activities, agreeing or disagreeing with someone else's claim, asking a question).

2. **Personal philosophies paper** – *15 points – due on or before 09/01/08*
This paper is an opportunity for you to begin to grapple with (or continue to grapple with) your philosophies related to science, learning, and teaching. In no more than 3-6 pages, please address the following questions:

a. What is science? What does it look like when people participate in science?
b. What does it mean to learn something? What does it look like when people learn something? What does it look like to learn science?
c. What does it mean to teach something? What does it look like when people are teaching? What does it look like when people are teaching science?
d. What does youth culture have to do with learning and teaching science?
e. Where do you think you got these ideas? Where do you think your ideas come from? How did you arrive at these ideas?

There are no right or wrong answers to these questions. We will revisit your responses later in the semester so that you can reflect on your responses at the beginning of the course and your responses toward the end of the course.

Please label each section of your paper (e.g., "What is science?", "What is learning?", "What is teaching?") so that it is clear which questions you are addressing in each section. As stated above, please use 1" margins and 12 point Times New Roman font. As with all assignments, I expect you to attend closely and carefully to spelling and grammar.

You will *upload your paper to Blackboard on or before September 1, 2008*.

3. **Field-based student interviews** – *20 points each for a total of 60 points*
My philosophy is that we need to hear more youth voice regarding issues of learning and teaching. You will interview three different students during your field experiences about three different topics. You will then summarize your questions and the students' responses in a paper, where you also reflect on student responses in light of how they might inform your science teaching (and your teaching in general). *Please upload all interview assignments into Blackboard*.

a. [Thoughts about Science] What is science? – *due on or before 09/15/08*
b. [Thoughts about Learning] What are you expert at doing? How did you learn how to do whatever you are expert at doing? How would you like to learn science and why? – *due on*

*or before 09/29/08*

c. [Thoughts about Teaching] What do you wish your teacher knew about you but doesn't? What advice do you have for anyone wanting to teach kids your age? What parts of your culture do you wish you could spend more time learning about in school? – *due on or before 10/29/08*

4. **Inquiry investigation and poster presentation –** *55 points*

My philosophy is that it will be difficult for you to understand inquiry let alone incorporate scientific practices into your teaching if you have never experienced what it is like to inquire into something of interest to you. Working in groups of two or three, you will identify a topic of interest, generate a question, propose a plan to examine that question, collect and analyze data, and report your results to the rest of us.

a. Inquiry Plan Proposal – *15 points – due on or before 09/21/08 at 9:00 p.m. via Blackboard*

b. Presentation of Study – *25 points – due on 10/03/08 in class*

c. Reflections on the Process – *15 points – due on or before 10/03/08 via Blackboard*

5. **Lesson plan and micro teaching demonstration** – *155 points*

The lesson plan portion of this assignment is a Core Assessment for standards CF1 and CF5, which are both written out in their entirety at the beginning of this syllabus. Please see pages 15-24 of this syllabus for the requirements that need to be included in your lesson plan, as well as the rubric I will use to evaluate your plan.

In addition to creating the lesson plan, you will teach it (or a part of it) to the rest of us on either November 10 or November 17. This will give you an opportunity to try out your lesson (or a part of it) and reflect on the outcomes.

The various pieces of this assignment, including the lesson plan, and their point values are as follows:

a. Lesson Plan Standard(s) and Objectives (including your rationale for selecting the standard[s] you did, an explanation of what the standard[s] means and what tools you used to help you understand its/their wording, the objectives you designed to target the standard[s] you chose, and your rationale for designing the objectives the way you did) – *15 points – due on or before 10/20/08 via Blackboard.*

b. Lesson Plan – *110 points – due on or before 11/10/08 via LiveText*

c. Micro Teaching - *15 points – 11/10/08 OR 11/17/08*

d. Reflections on Process – *15 points – due on or before 11/17/08* (if you teach on 11/10/08) *OR 11/24/08* (if you teach on 11/17/08) *via Blackboard*.

6. **Science kit or textbook revision and reflections on process** – *55 points*

Because teachers do not always design their own lessons/units but rather revise existing materials, you will select a portion of a science kit or textbook and revise it according to specific criteria. *This assignment will be due on or before the last day of class – December 1, 2008*. In addition to your revision, you will reflect on the process.

7. **Course reflections** – *25 points*

This last assignment will provide an opportunity for you to reflect on the course and give me

feedback. You will reflect on the following topics using guidelines I will give to you. *This assignment will be due on or before December 8, 2008 via Blackboard.*

a. the course in general
b. resources that will help you 'hit the ground running'
c. your professional development plan for the next five years
d. questions you still have about science learning and teaching

COURSE SCHEDULE*
*I reserve the right to revise this schedule as needed.

**Week 1: August 25, 2008 Introduction**

We will begin to form our community by starting to grapple with the guiding questions of the course: What is science? What does it mean to learn science (and learn in general)? What does it mean to teach science?

**ASSIGNMENTS:**

1. Paper detailing personal philosophies of science, learning, and teaching. Due on or before September 1, 2008. Please upload to Blackboard. *15 points*
2. Using Blackboard's discussion forum, pose at least one question about the readings for the next class session and respond to at least one question someone else has posed. Due on or before September 7, 2008 at 9:00 p.m.

**Week 2: September 1, 2008No Class – Labor Day**

**Week 3: September 8, 2008 What is science? – State and national perspectives**

ASSIGNED READINGS TO BE COMPLETED BEFORE THIS CLASS

1. Michaels, S., Shouse, A.W., & Schweingruber, H.A., (2008). *Ready, set, science! Putting research to work in K-8 science classrooms*. Washington, DC: National Academies Press.
   - Read Chapters 1 and 2 – "A New Vision of Science in Education" (pp. 1-16); "Four Strands of Science Learning" (pp. 17-36).
2. American Association for the Advancement of Science/Project 2061. (1989). *Science for all Americans*. New York, NY: Oxford University Press.
   - Read Chapter 13 - "Effective Learning and Teaching" (pp. 197-207). You can find the chapter online at: http://www.project2061.org/publications/sfaa/default.htm
3. Illinois State Board of Education (2003). *Illinois Learning Standards*. Springfield, IL: ISBE.
   - Read the introductory text. You can find it online at: http://www.isbe.state.il.us/ils/science/standards.htm
4. National Research Council. (1996). *National science education standards.* Washington, DC: National Academy Press.

- Read Chapter 3 – "Science Teaching Standards (pp. 27-53). You can find the chapter online at: http://www.nap.edu/html/nses

**ASSIGNMENTS**:

1. Using Blackboard's discussion forum, pose at least one question about the readings for the next class session and respond to at least one question someone else has posed. Due on or before September 14, 2008 at 9:00 p.m.
2. First field-based assignment: Student interview – "Thoughts about Science." Due on or before September 15, 2008. Please upload to Blackboard and be ready to discuss your findings in class. *20 points*

**Week 4: September 15, 2008 What is science? – Perspectives from scientists and youth**

ASSIGNED READINGS TO BE COMPLETED BEFORE THIS CLASS

1. Alberts, B. (2000). Some thoughts of a scientist on inquiry. In J. Minstrell and E.H. van Zee (Eds.), *Inquiring into inquiry learning and teaching in science* (pp. 3-13). Washington, DC: American Association for the Advancement of Science.
2. Feynman, R. (1969). What is science? *The Physics Teacher, 7*(6), 313-320.
3. Dennett, D.C. (2004). What I want to be when I grow up. In J. Brockman (Ed.), *Curious minds: How a child becomes a scientist* (pp. 219-225). New York, NY: Pantheon Books.

**ASSIGNMENTS**:

1. Using Blackboard's discussion forum, pose at least one question about the readings for the next class session and respond to at least one question someone else has posed. Due on or before September 21, 2008 at 9:00 p.m.
2. Inquiry groups must select a topic and submit a proposal for an inquiry project. Due on or before September 21, 2008 at 9:00 p.m. Please submit via Blackboard and be ready to discuss your proposals in class. *15 points*

**Week 5: September 22, 2008 What is "learning"?**

ASSIGNED READINGS TO BE COMPLETED BEFORE THIS CLASS

1. Michaels, S., Shouse, A.W., & Schweingruber, H.A., (2008). *Ready, set, science! Putting research to work in K-8 science classrooms*. Washington, DC: National Academies Press.
   - Read Chapter 3 – "Foundational Knowledge and Conceptual Change" (pp. 37-58)
2. Donovan, M.S., & Bransford, J.D. (Eds.) (2005). *How students learn science in the classroom*. Washington, DC: National Academies Press.
   - Read Chapters1 and 9 – "Introduction" (pp. 1-26); "Scientific Inquiry and *How People Learn*" (pp. 397-419).

**ASSIGNMENTS**:

1. Using Blackboard's discussion forum, pose at least one question about the readings for the next class session and respond to at least one question someone else has posed. Due on or before September 28, 2008 at 9:00 p.m.

2. Second field-based assignment: Student interview – "Thoughts about Learning." Due on or before September 29, 2008. Please upload to Blackboard and be ready to discuss your findings in class. *20 points*
3. Continue working in your inquiry groups on your inquiry projects. Remember that poster presentations will take place on October 13. Reflections on the process are also due that day. *25 points for poster presentation & 15 points for reflections on the process*

**Week 6: September 29, 2008 Learning…continued**

ASSIGNED READINGS TO BE COMPLETED BEFORE THIS CLASS

1. Banks, J.A., et al. (2007). *Learning in and out of school in diverse environments: Life-long, life-wide, life-deep.* Seattle, WA: The LIFE (Learning in Informal and Formal Environments) Center and the Center for Multicultural Education – University of Washington. You can access this report at: http://life-slc.org/?p=498
2. Rogoff, B., Turkanis, C.G., & Bartlett, L. (2001). *Learning together: Children and adults in a school community*. Oxford, UK: Oxford University Press.
   - Read the introduction – "Lessons about Learning as a Community" (pp. 3-17).

**ASSIGNMENTS**:

1. Using Blackboard's discussion forum, pose at least one question about the readings for the next class session and respond to at least one question someone else has posed. Due on or before October 12, 2008 at 9:00 p.m.
2. Continue working in your inquiry groups on your inquiry projects. Remember that poster presentations will take place on October 13. Reflections on the process are also due that day. *25 points for poster presentation & 15 points for reflections on the process*

**Week 7: October 6, 2008 No Class – Mid-Semester Break**

**Week 8: October 13, 2008 What is "inquiry"? & Inquiry project presentations**

ASSIGNED READINGS TO BE COMPLETED BEFORE THIS CLASS

1. Michaels, S., Shouse, A.W., & Schweingruber, H.A., (2008). *Ready, set, science! Putting research to work in K-8 science classrooms*. Washington, DC: National Academies Press.
   - Read Chapter 7 – "Learning from Science Investigations" (pp. 127-148).
2. National Research Council (2000). *Inquiry and the national science education standards*. Washington, DC: National Academy Press.
   - Read Chapter 1 – "Inquiry in Science and in Classrooms" (pp. 1-11). You can access this text (possibly without graphics) at: http://www.nap.edu/openbook.php?record_id=9596
3. National Science Foundation (2000). Inquiry: Thoughts, views, and strategies for the K-5 classroom. *Foundations, 2*, 9-13, 51-62, & 63-70.
   - Read Chapters 2, 7, & 8 – "What Children Gain by Learning Through Inquiry" (pp. 9-13); "The Process Skills of Inquiry" (pp. 51-62); "Setting the Stage for Inquiry" (pp. 63-

70). You can access this text at: http://www.nsf.gov/pubs/2000/nsf99148/htmstart.htm

**ASSIGNMENTS**:

1. Using Blackboard's discussion forum, pose at least one question about the readings for the next class session and respond to at least one question someone else has posed. Due on or before October 19, 2008 at 9:00 p.m.
2. Select a standard or two (maximum) to focus on for your lesson plan design and micro-teaching demonstration. In no more than three pages, list the standard(s) you chose, your rationale for choosing it/them, an explication of what the standard(s) means and how you came to that conclusion (i.e., what tools you used), the objectives you have developed to target your chosen standard(s), and your rationale for designing those objectives. Due on or before October 20, 2008 via Blackboard. *15 points*

**Week 9: October 20, 2008 How do we design science learning environments?**

ASSIGNED READINGS TO BE COMPLETED BEFORE THIS CLASS

1. Michaels, S., Shouse, A.W., & Schweingruber, H.A., (2008). *Ready, set, science! Putting research to work in K-8 science classrooms*. Washington, DC: National Academies Press.
   - Read Chapter 4 – "Organizing Science Education Around Core Concepts" (pp. 59-86).
2. Lemke, J.L. (1990). *Talking science: Language, learning, and values*. Westport, CT: Ablex Publishing.
   - Read Chapter 7 – "Changing the Way We Teach" (pp. 167-181).
3. Stigler, J.W., & Hiebert, J. (1999). *The teaching gap: Best ideas from the world's teachers for improving education in the classroom*. New York, NY: The Free Press.
   - Read Chapter 9 – "The Steady Work of Improving Teaching" (pp. 149-168).

**ASSIGNMENTS**:

1. Using Blackboard's discussion forum, pose at least one question about the readings for the next class session and respond to at least one question someone else has posed. Due on or before October 26, 2008 at 9:00 p.m.
2. Third field-based assignment: Student interview – "Thoughts about Teaching." Due on or before October 27, 2008. Please upload to Blackboard and be ready to discuss your findings in class. *20 points*
3. Continue working on your lesson plan.

**Week 10: October 27, 2008 Culturally responsive science teaching**

ASSIGNED READINGS TO BE COMPLETED BEFORE THIS CLASS

1. McIntyre, E., Rosebery, A., & González, N. (2001). *Classroom diversity: Connecting curriculum to students' lives*. Portsmouth, NH: Heinemann.
   - Read Chapters 1 & 11 – "Connecting Students' Cultures to Instruction" (pp. 1-13); "Seeing, Believing, and Taking Action" (pp. 115-122).
2. Barton, A.C., Ermer, J.L., Burkett, T.A., & Osborne, M.D. (2003). *Teaching science for social justice*. New York, NY: Teachers College Press.

- Read Chapters 1, 7, & 8 – "Overview: Youth lives and youth science" (pp. 18); "Building Communities in Support of Youth's Science Practices" (pp. 138-157); "Empowering Science Education and Youth's Practices of Science" (pp. 158-169).

**ASSIGNMENTS**:

1. Using Blackboard's discussion forum, pose at least one question about the readings for the next class session and respond to at least one question someone else has posed. Due on or before November 2, 2008 at 9:00 p.m.
2. Continue working on your lesson plan.

**Week 11: November 3, 2008 Talking and writing science**

ASSIGNED READINGS TO BE COMPLETED BEFORE THIS CLASS

1. Michaels, S., Shouse, A.W., & Schweingruber, H.A., (2008). *Ready, set, science! Putting research to work in K-8 science classrooms*. Washington, DC: National Academies Press.
   - Read Chapter 5 – "Making Thinking Visible: Talk and Argument" (pp. 87-108).
2. Bricker, L.A. (2008). Youth ideas about their argumentative practices (working title). Excerpts from a doctoral dissertation about youth argumentation.
3. Fulwiler, B.R. (2007). *Writing in science: How to scaffold instruction to support learning*. Portsmouth, NH: Heinemann.
   - Read Chapters 2, 3, & 8 – "Using Science Notebooks in Integrating Science and Expository Writing Instruction" (pp. 12-27); "Developing and Organizing Scientific Understanding and Thinking: Science Word Banks and Graphic Organizers" (pp. 28-43); "Twelve Tips for Implementing this Integrated Science-Writing Approach" (pp. 147-149).

**ASSIGNMENTS**:

1. Using Blackboard's discussion forum, pose at least one question about the readings for the next class session and respond to at least one question someone else has posed. Due on or before November 9, 2008 at 9:00 p.m.
2. Continue working on your lesson plan. All lesson plans are due next week on or before class. Those of you doing your micro teaching next week in class should come prepared with any materials and/or tools you will need to teach.

**Week 12: November 10, 2008 How do we know what they know?: Assessment in science & Micro-teaching**

ASSIGNED READINGS TO BE COMPLETED BEFORE THIS CLASS

1. Atkin, J.M., & Coffey, J.E. (Eds.) (2003). *Everyday assessment in the science classroom*. Arlington, VA: NSTA Press.
   - Read Chapters 1 & 2 – "The Importance of Everyday Assessment" (pp. 1-11); "Learning through Assessment: Assessment *for* Learning in the Science Classroom" (pp. 13-25).
2. Fulwiler, B.R. (2007). *Writing in science: How to scaffold instruction to support learning*.

Portsmouth, NH: Heinemann.
- Read Chapter 6 – "Assessing Science Notebook Entries" (pp. 113-132).

**ASSIGNMENTS**:

1. Using Blackboard's discussion forum, pose at least one question about the readings for the next class session and respond to at least one question someone else has posed. Due on or before November 16, 2008 at 9:00 p.m.
2. Those of you who did your micro teaching today in class, your reflections on the process are due on or before November 17, 2008 via Blackboard. *15 points*
3. Those of you doing your micro teaching next week in class should come prepared with any materials and/or tools you will need to teach.

**Week 13: November 17, 2008 Making connections with other disciplines & Micro-teaching continued…**

ASSIGNED READINGS TO BE COMPLETED BEFORE THIS CLASS

1. Gee, J.P. (2004). Language in the science classroom: Academic social languages as the heart of school-based literacy. In E.W. Saul (Ed.), *Crossing borders in literacy and science instruction: Perspectives on theory and practice* (pp. 13-32). Arlington, VA: NSTA Press.
2. American Association for the Advancement of Science/Project 2061. (1993). *Benchmarks for science literacy*. New York, NY: Oxford University Press.
   - Read Chapters 11 & 12 – "Common Themes" (pp. 261-279); "Habits of Mind" (pp. 281-300). You can find these chapters online at: http://www.project2061.org/publications/bsl/default.htm

**ASSIGNMENTS**:

1. Using Blackboard's discussion forum, pose at least one question about the readings for the next class session and respond to at least one question someone else has posed. Due on or before November 23, 2008 at 9:00 p.m.
2. Those of you who did your micro-teaching today in class, your reflections on the process are due on or before November 24, 2008 via Blackboard. *15 points*
3. Begin working on your science kit or textbook revision. These are due on December 1, 2008.

**Week 14: November 24, 2008 What additional information do you need?**

ASSIGNED READINGS TO BE COMPLETED BEFORE THIS CLASS

1. Michaels, S., Shouse, A.W., & Schweingruber, H.A., (2008). *Ready, set, science! Putting research to work in K-8 science classrooms*. Washington, DC: National Academies Press.
   - Read Chapter 8 – "A System that Supports Science Learning" (pp. 149-166).

[NOTE: Additional readings will be determined once the class decides which topic(s) it wants to address.]

**ASSIGNMENTS**:

1. Continue working on your science kit or textbook revision. The revisions, as well as your reflections on the process, are due next week.
2. Begin your final reflections of the course. These are due via Blackboard by December 8, 2008.

**Week 15: December 1, 2008 Wrap-up, reflections, new questions – What's next?**

[NOTE: There are no readings for this week. Your science kit or textbook revisions are due (*55 points)* in class and we will discuss them, as well as review the main themes of the course.]

**ASSIGNMENTS**:

1. Finish up your final course reflections. Due on December 8, 2008, via Blackboard, by 5:00 p.m. *25 points*

LESSON PLAN ASSIGNMENT
[NOTE: As stated in the syllabus, this assignment is a School of Education Core Assessment meeting standards CF1 and CF5. It also targets ACEI standards 2.2, 3.1, 3.2, 3.3, 3.4, and 3.5]

Your task is to design a 50-min lesson that should accurately illustrate a concept from your content area as well as provide some focus on inquiry and/or the nature of science. The lesson plan assignment involves a very comprehensive and detailed account of a science lesson that you select for elementary/middle grade level.

In your lesson plan, you need to identify the target grade and describe the target population and the relevance of the lesson for this population. You need to describe the specific behavior that the students will perform, the conditions under which it will be performed, and the criteria for assessing mastery. You need to include connections to both local (Illinois) and national (National Science Education Standards) standards. You need to present fundamental science concepts that are accurate, and design a lesson that is inquiry-oriented and conveys the nature of science. You need to include all materials including electronic files that are needed for the lesson. You need to describe how the lesson will work, and include all segments of the lesson with the estimated time of each, making sure there is consistency among different segments. You need to describe the lesson so that another teacher could understand it and implement it without your presence. The lesson needs to include multiple teaching and learning strategies that will promote development of critical thinking and problem solving. You need to describe the assessment measure for determining whether the lesson's objective(s) were met. You need to integrate technology into your lesson plan. The lesson needs to be intrinsically motivating, and builds upon students' prior beliefs, knowledge, experiences, and interests. The lesson needs to include accommodations designed to achieve maximum congruity with the learning styles, abilities, and cultural factors of students. The lesson needs to include connections to other disciplines.

LESSON PLAN ASSIGNMENT RUBRIC

| | Target | Acceptable | Unacceptable |
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| **Target Grade/ Subject**<br><br>Identify the target grade and describe the target population and the relevance of the lesson for this population. This should be a full paragraph that describes the population's likes, dislikes, their developmental stage, etc.<br><br>(10 pts) | The unique attributes of your target population are very clear and the appropriateness of the lesson (for this group) is obvious.<br><br>(10-9 pts) | Description of target population is general and the appropriateness of the lesson (for this group) is clear.<br><br>(8-6 pts) | Description of target population is vague and/or, the appropriateness of the lesson (for this group) is not convincing.<br><br>(5-0 pts) |
| **Objective(s)**<br><br>Describe the specific behavior that the students will perform, the conditions under which it will be performed, and the criteria for assessing mastery.<br><br>Connections to both local (Illinois) and national (National Science Education Standards) standards are included<br>(10 pts)<br><br>Relevant NSTA Standards:<br>6a. Understand the curricular recommendations of the National Science Education Standards, and can identify, access, and/or create resources and activities for science education that are consistent with the standards.<br>6b. Plan and implement internally consistent units of study that address the diverse goals of the National Science Education Standards and the needs and abilities of students.<br><br>Relevant IL Standards:<br>16A. understands the alignment of student learning standards, instructional | Behavior, criteria, and conditions are clearly communicated and clearly and concisely written.<br><br>Connections to both local and national standards are included<br><br>(10-9 pts) | Two of the three (behavior, criteria, and/or conditions) are apparent.<br><br>Connections to either the local or the national standards are included<br><br>(8-6 pts) | Behavior, criteria, and/or conditions are unclear or missing.<br><br>Connections to local and national standards are not included<br><br>(5-0 pts) |

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| strategies, and local curriculum in the development of assessment tools and strategies.<br>16D. understands the importance and impact of state and local assessment policies. | | | |
| **Content**<br><br>Present fundamental science concepts that are accurate. Design a lesson that is inquiry-oriented and conveys the nature of science<br><br>(10 pts)<br><br>Relevant NSTA Standards:<br>1a, 1b, 1c<br><br>Relevant IPTS Standards:<br>1A<br><br>Relevant ACEI Standards:<br>**Standard 2.2 Science—** Candidates know, understand, and use fundamental concepts of physical, life, and earth/ space sciences. Candidates can design and implement age-appropriate inquiry lessons to teach science, to build student understanding for personal and social applications, and to convey the nature of science; | Science concepts presented are accurate. The lesson is inquiry-oriented and conveys the nature of science.<br><br>(10-9 pts) | Science concepts presented are generally accurate. The lesson is generally inquiry-oriented and conveys the nature of science.<br><br>(8-6 pts) | Science concepts presented contain inaccuracies. The lesson is generally not inquiry-oriented and does not convey the nature of science.<br><br>(5-0 pts) |
| **Materials and Safety**<br><br>Include all materials (and explanations if necessary) including electronic files that are needed for lesson. A safety plan or safety precautions are taken care of<br><br>(10 pts) | Materials are provided and explained. A detailed safety plan is enclosed<br><br>(10-9 pts) | All materials are included but how they are to be used is a bit unclear. Some safety guidelines are provided<br><br>(8-6 pts) | All materials are not included and/or are poorly organized. No safety guidelines are provided<br><br>(5-0 pts) |

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| Relevant NSTA Standards:<br><br>9a. Understand the legal and ethical responsibilities of science teachers for the welfare of their students, the proper treatment of animals, and the maintenance and disposal of materials.<br><br>9b. Know and practice safe and proper techniques for the preparation, storage, dispensing, supervision, and disposal of all materials used in science instruction.<br><br>9c. Know and follow emergency procedures, maintain safety equipment, and ensure safety procedures appropriate for the activities and the abilities of students. | | | |
| **Lesson Description**<br><br>Describe how the lesson will work. All segments of the lesson with the estimated time of each are included and there is consistency among different segments. You will describe the lesson so that another teacher could understand it and implement it without your presence. (Note - use a bulleted or numbered list to clearly organize the procedures to follow.). The lesson includes multiple teaching and learning strategies that will promote development of critical thinking and problem solving.<br><br>You will also (a) include all your planned questions in the lesson, (b) specify what you will do with student responses and (c) consider of what you will do if desired response is | Description is sufficiently clear to enable a third party to try the lesson out. Description is clear yet economically written.<br><br>All the required elements are explicitly and clearly covered<br><br>The lesson includes multiple teaching and learning strategies that will promote development of critical thinking and problem solving.<br><br>(20-18 pts) | Description is fairly clear. It may be a bit wordy and/or repetitive.<br><br>Two or more required components are present and explicitly covered.<br><br>The lesson includes multiple teaching and learning strategies that do not promote development of critical thinking and problem solving.<br><br>(17-14 pts) | Description is unclear and difficult to follow.<br><br>Less than two components of the lesson plan are present.<br><br>The lesson does not include multiple teaching and learning strategies<br><br>(13-0 pts) |

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| not received<br><br>Relevant ACEI Standards: **3.3 Development of critical thinking and problem solving—**Candidates understand and use a variety of teaching strategies that encourage elementary students' development of critical thinking and problem solving.<br><br>(20 pts) | | | |
| **Evaluation Procedure**<br><br>Describe the assessment measure for determining whether the lesson's objective(s) were met.<br><br>(10 pts)<br><br>Relevant IL Standards:<br>16H. plans and conducts assessment to evaluate student understanding using a variety of tools and strategies.<br><br>Relevant ACEI Standards:<br>**Standard 4. Assessment for instruction—**Candidates know, understand, and use formal and informal assessment strategies to plan, evaluate and strengthen instruction that will promote continuous intellectual, social, emotional, and physical development of each elementary student. | The behavior assessed exactly matches the behavior described in the objective and description of the lesson.<br><br>(10-9 pts) | The behavior assessed closely resembles the behavior described in the objective and description of the lesson.<br><br>(8 -6 pts) | The behavior assessed is inconsistent with the behavior described in the objective and description of the lesson.<br><br>(5-0 pts) |
| **Technology Support?**<br><br>Does technology SUPPORT instructional activity? Technology should not BE the lesson. Do not teach students how to use a word processor for example. Use technology as a tool. Is the use of | The technology supports the instructional objective in a meaningful way. It enhances it and possibly facilitates additional beneficial outcomes not directly measured.<br><br>(10-9 pts) | The technology does support the lesson but may "get in the way" somewhat, e.g., when students need to "learn" to use the software as a separate endeavor.<br><br>(8-6 pts) | Technology tends to be the focus of the lesson. Technology intrudes into the lesson or becomes the activity itself, e.g., teaching students how to use a spreadsheet.<br><br>(5-0 pts) |

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| technology transparent? Students should learn how to use the application without being aware of it. It is a means to an end, not an end in and of itself.<br><br>(10 pts)<br><br>Relevant NSTA Standards:<br>5d. Successfully use technological tools, including but not limited to computer technology, to access resources, collect and process data, and facilitate the learning of science.<br>Relevant IPT Standards:<br>4E. Understands how to integrate technology into classroom instruction<br>4H. Understands the uses of technology to address student needs.<br>CF-5: Candidates demonstrate technological knowledge and skills which enhance education. | | | |
| **Motivating Lesson?**<br><br>Is the lesson/activity intrinsically motivating? Does it build upon students' prior beliefs, knowledge, experiences, and interests? The activity must engage and motivate. Ask yourself the question "Why will students care?"<br><br>(10 pts)<br><br>Relevant NSTA Standards:<br>5e. Understand and build effectively upon the prior beliefs, knowledge, experiences, and interests of students.<br>Relevant IPT Standards:<br>5D. Understands factors that influence motivation and | Activity is interesting and engaging for the target population. It builds upon students' prior beliefs and experiences. It is fun, even goofy enough to motivate students to do whatever it takes to accomplish it and would want to do it again.<br><br>(10-9 pts) | Activity is reasonably different from students' normal classroom activities. It builds upon students' prior beliefs and experiences. Students are motivated to try the activity.<br><br>(8-6 pts) | The activity is dry and boring. The activity does not build upon students' prior knowledge and experiences.<br><br>(5-0 pts) |

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| engagement and how to help students become self-motivated.<br><br>Relevant ACEI Standards:<br>**Standard 3.4 Active engagement in learning—** Candidates use their knowledge and understanding of individual and group motivation and behavior among students at the K-6 level to foster active engagement in learning, self motivation, and positive social interaction and to create supportive learning environments;<br><br>**Standard 1. Development, Learning, and Motivation—** Candidates know, understand, and use the major concepts, principles, theories, and research related to development of children and young adolescents to construct learning opportunities that support individual students' development, acquisition of knowledge, and motivation. | | | |
| **Accommodations**<br><br>Lesson includes accommodations designed to achieve maximum congruity with the learning styles, abilities, and cultural factors of students.<br>(10 pts)<br><br>Relevant NSTA Standards:<br>5a. Vary their teaching actions, strategies, and methods to promote the development of multiple student skills and levels of understanding.<br>5b. Successfully promote the learning of science by students | Lesson includes several accommodations to address different learning styles, abilities, and cultural factors of students.<br><br>(10-9 pts) | Lesson includes few accommodations to address different learning styles, abilities, and cultural factors of students.<br><br>(8-6 pts) | Lesson does not include any accommodations to address different learning styles, abilities, and cultural factors of students.<br><br>(5-0 pts) |

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| with different abilities, needs, interests, and backgrounds.<br><br>Relevant IPT Standards:<br>3A. Understands the areas of exceptionality in learning as defined in the Individuals with Disabilities Act (IDEA) and the Illinois Administrative Code.<br>3B. Understands the process of second language acquisition and strategies to support the learning of students whose first language is not English.<br>3C. Understands how students' learning is influenced by individual experiences, talents, and prior learning, as well as language, culture, family, and community values.<br>3D. Understands and identifies differences in approaches to learning and performance, including different learning styles, multiple intelligences, and performance modes.<br><br>3E. Understands cultural and community diversity through a well-grounded framework and understands how to learn about and incorporate students' experiences, cultures, and community resources into instruction.<br><br>Relevant ACEI Standards: 3.2 Adaptation to diverse students—Candidates understand how elementary students differ in their development and approaches to learning, and create instructional opportunities that are adapted to diverse students; | | | |

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| **Interdisciplinary Connections**<br>Lesson includes connections to other disciplines.<br><br>**(10 pts)**<br><br>IPTS 1L<br><br><u>Relevant ACEI Standards:</u><br>**Standard 2.3 Mathematics**—Candidates know, understand, and use the major concepts and procedures that define number and operations, algebra, geometry, measurement, and data analysis and probability. In doing so they consistently engage problem solving, reasoning and proof, communication, connections, and representation;<br><br>**Standard 2.4 Social studies**—Candidates know, understand, and use the major concepts and modes of inquiry from the social studies—the integrated study of history, geography, the social sciences, and other related areas —to promote elementary students' abilities to make informed decisions as citizens of a culturally diverse democratic society and interdependent world;<br><br>**Standard 2.5 The arts**—Candidates know, understand, and use—as appropriate to their own understanding and skills—the content, functions, and achievements of the performing arts (dance, music, theater) and the visual arts as primary media for communication, inquiry, and engagement among elementary students;<br><br>**Standard 2.6 Health education**—Candidates know, | Interdisciplinary connections are highly appropriate, meaningful and relevant.<br><br>(10-9 pts) | Interdisciplinary connections are appropriate, meaningful and relevant.<br><br>(8-6 pts) | Interdisciplinary connections are not appropriate, meaningful and/or relevant.<br><br>(5-0 pts) |

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| understand, and use the major concepts in the subject matter of health education to create opportunities for student development and practice of skills that contribute to good health;<br><br>**Standard 2.7 Physical education**—Candidates know, understand, and use—as appropriate to their own understanding and skills—human movement and physical activity as central elements to foster active, healthy life styles and enhanced quality of life for elementary students. | | | |