Early Childhood, Elementary, and Middle Level Education Department
ELE3290: Science in the Elementary School

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Class Meetings: **MW 8:00a – 9:40a, 10:00a – 11:40a, 1:00p- 2:40p**

Unit Theme: Educators as Creators of Effective Educational Environments: Integrating diverse students, subjects, strategies, societies and technologies.

Catalog Description: Science in the Elementary School.. This course encompasses the exploration of the nature, processes, and products of science and their relationships to society, the world, and the school curriculum. Field-based experiences will be in conjunction with ELE 4000.

Prerequisites: Concurrent enrollment in ELE 3340 and ELE 4880, or permission of department chair. University Teacher Education requirements apply and department requirements for enrollment must be met.

Purpose of the Course: To involve students in the process of learning about the nature of science; a sample of its content and the methods used to teach the content. Using theories of how children learn as a basis for instruction, the students develop their skills at teaching science processes through discovery, guided discovery, and inquiry lessons. Students will also understand the importance of assessment and evaluation, and will develop various means of assessment. ***Students will integrate technology in their lessons, projects, and science units.***

Course Text:
Martin, R., Sexton, S., Wagner, K., & Gerlovich, J. (2005). *Teaching science for all children* (4th ed.). Boston: Allyn & Bacon.

Carin, A. A., Bass, J. E., Contant, T. L. (2005). *Activities for teaching science as inquiry* (6th ed.). Upper Saddle River, NJ: Pearson,

Merrill Prentice Hall.

Supplemental Materials
LiveText Account & Course packet.

Learning Model:
The Information-Processing Models

- Information-processing models emphasize ways of enhancing the human being's innate drive to make sense of the world by acquiring and organizing data, sensing problems and generating solutions to them, and developing concepts and language for conveying them.

Joyce, B., Weil, M., & Calhoun, E. (2009). *Models of teaching*. (8th ed.). Boston: Pearson.

Dispositions: Teacher candidates in the Department of EC/ELE/MLE will exhibit professional ethical practices, effective communication, and sensitivity to diversity, the ability to provide varied teaching practices evidenced in a supportive and encouraging environment.

Live Text Assessment Requirement: For those classes with Live Text or Practicum- If the portfolio or Live Text requirements are rated, by the instructor, to have been completed in less than a satisfactory manner then no more than a "D" may be earned in the class regardless of the number of points earned.

Standards:
Course requirements and demonstrated competencies are aligned with the following standards:

- Association for Childhood Education International Standards (ACEI) http://www.acei.org/Synopsis.htm
- Illinois Standards for Certification in Special Teaching Fields-Elementary (ELE) http://www.isbe.net/profprep/CASCDvr/pdfs/26310_elementaryed.pdf
- Illinois Professional Teaching Standards (IPTS) http://www.isbe.state.il.us/profprep/PDFs/ipts.pdf
- Illinois Core Language Arts Standards (ICLAS) http://www.isbe.net/profprep/CASCDvr/pdfs/24110_corelangarts_std.pdf
- Illinois Core Technology Standards (ICTS) http://www.isbe.net/profprep/CASCDvr/pdfs/24100_coretechnology.pdf

Course Outcomes

1. The students will exhibit a positive attitude toward providing meaningful experiences in science for young students.
2. The students will demonstrate an understanding of the nature of science, the learner, and the learning environment.
3. The students will demonstrate a working knowledge of appropriate science learning and hands-on inquiry experiences for children.
4. The students will exhibit the ability to effectively utilize various types of materials, resources, and media to engage children in meaningful science experiments.
5. The students will demonstrate knowledge of assessment and evaluation procedures for science.
6. The students will demonstrate the ability to plan, implement, and assess science instruction for elementary students.
7. The students will become familiar with the Illinois Learning Standards for Science and the National Science Education Standards.

Course Requirements	Demonstrated Competencies	Aligned Standards (ACEI, ELE, IPTS, ICTS, ICLAS)
Participation	Performance includes presence, participation and preparation for group and whole class discussions, and participation in lab activities working cooperatively with peers. Focus is on practices and behaviors that allow the learner to grow professionally.	ACEI 5.1 ELE 16, 17 IPTS10, 11 ICTS 2E, 6C, 6D ICLAS 2D, 2E, 2H Dispositions: PEP, EC, SDE
Science notebook & lab sheets	Performance includes organizing science notebook in order to create a useful teaching resource. This resource will include handouts, assignments, lab sheets, demonstration lessons and a detailed Table of Contents. Focus is on developing a professional resource that can be used to plan and implement developmentally appropriate lessons using inquiry-based activities.	ACEI 2.2 ELE 4 IPTS 1, 7, 10 ICTS 2B ICLAS 2B Dispositions: PEP, EC, PTSL
Readings & written responses (Textbook & Journal Articles)	Performance will include reading, reflecting, and preparing for discussion of content related to science teaching and learning (constructivism, inquiry, assessment, questioning, learning cycle model, developmentally appropriate practices, etc.) Focus is on increasing the participant's knowledge and understanding of the learning theory and processes related to science teaching methods.	ACEI 2.2, 3.1, 3.3 ILSCSTF IPTS 1 ICTS 2E, 7K ICLAS 1E, 2B, 2D, 2F Dispositions: PEP, EC
Quizzes & Tests	Tests will be provided as one form of assessment of student's content knowledge related to planning and teaching effective science lessons. Focus is on demonstrating understanding of course content knowledge.	ACEI 2.2 ELE 4,16 IPTS 1, 8 ICLAS Dispositions: EC, PTSL
Science Unit*	Performance includes creating a two-week science unit that is developmentally appropriate and inquiry based. The lesson plans will follow the learning cycle model. Lessons will allow elementary students to develop conceptual understanding. Appropriate informal and formal assessment activities will be included. Focus is on developing a developmentally appropriate inquiry-based science unit that fosters conceptual	IPTS 1, 2, 3, 4, 6, 7, 8, ICTS 2E, 6A, 6C, 7J, 8A, 8D ACEI 1, 2.2, 3.1, 3.2, 3.3, 3.4, 4, NAEYC 4b, 4c, 4d Dispositions:

	understanding.	PEP, EC, PTSL, SDE
Demonstration Lesson & Group Presentation	Performance includes working cooperatively with peers to select demonstration lessons around a theme. Each demonstration lesson will foster inquiry. Performance will include demonstration understanding of the concept through effective questioning techniques for creating conceptual understanding and overall explanation of the concept.	ACEI 1, 2.2, 3.2, 3.3, ELE 4 IPTS 1, 3, 4, 6, 7 ICTS 7A, 7D, 7J, 8D ICLAS 1F, 2D, 2F Dispositions: PEP, EC, PTSL, IWS
***LiveText Submission**	**All or a portion of the Science Unit will be submitted through LiveText for Unit and Program Assessment.**	

Core Assignments	Brief Description	Points/Due Date	Approximate Weight
Participation	Performance includes presence, participation and preparation for group and whole class discussions, and participation in lab activities working cooperatively with peers. Focus is on practices and behaviors that allow the learner to grow professionally.		5% 50pts Throughout term
Science notebook & lab sheets	Performance includes organizing science notebook in order to create a useful teaching resource. This resource will include handouts, assignments, lab sheets, demonstration lessons and a detailed Table of Contents. Focus is on developing a professional resource that can be used to plan and implement developmentally appropriate lessons using inquiry-based activities.		10% 50 pts assignments TBA 50 pts Science Notebook 2 Dec.
Readings & written responses (Textbook & Journal Articles)	Select an article from a professional journal that corresponds with the relevant topic. Topics such as constructivism, inquiry-based learning, the learning cycle, using writing in science, authentic assessment, etc. Copy, read, highlight, and write reflective comments in the margins. Type a 1/2 to 1 page reflection that answers this question: What was the key idea presented in this article?		10% 100pts 31 Aug. Constructivism 2 Sept. Inquiry 14 Sept. Misconceptions 16 Sept . Authentic Assessment
Quizzes & tests	A midterm and a final will be given over the course content.		15% 50 pts. in class essays TBA 100 pts Final
Science Unit	An inquiry-based science unit will be developed. The unit will include: topic research, teacher resources, student resources, and lesson plans following the learning cycle model.		30% 300 pts. TBA
Demonstration lesson & group presentation	Performance includes working cooperatively with peers to select demonstration lessons around a theme. Each demonstration lesson will foster inquiry. Performance will include demonstration understanding of the concept		15% 100 pts Lesson Plan 50 pts Presentations TBA

	through effective questioning techniques for creating conceptual understanding and overall explanation of the concept. The lesson will be presented to peers and may include a presentation for elementary students.		
Alternative Assignments	Performance in the alternative assignments promotes life-long learning. The alternative assignments require effective communication related to the experiences. Performance increases awareness of outside agencies, materials, and resources.		15% See below.
***LiveText Submission**	**All or a portion of the Science Unit will be submitted through LiveText for Unit and Program Assessment.**		

Alternative Assignments

Alternative Assignment	**Brief Description**		**Aligned Standards (ACEI, ELE, IPTS, ICTS, ICLAS)** 10%
Illinois Learning Standards & National Science Education Standards Assignment (NSES) Included in Science Unit	Performance requires the students to be able to identify the three state science goals (11, 12, & 13) ultimately being able to identify the standards taught in his/her science unit. The students will be comparing the content standards developed by NSES with the content standards in state goal 12, recognizing the content is divided into three categories: life sciences, physical sciences, & earth and space sciences.		ACEI 2.2, 3.1, 5 ILSCTF-ELE 4, 10 IPTS 1, 4, 8 IPTS 3A, 6C, 8A ICLAS 3B
Examine a professional science journal (Science & Children, Science Scope, The Science Teacher, etc.) Included in Science Unit	Read the letter from the editor. What is his/her focus? Briefly describe the main features of the journal. Select one article to read. Write a brief summary. How could the classroom teacher use the information in this professional journal in his/her teaching? How could the classroom teacher use this information in her professional growth?		ACEI 2.2, 3.1, 3.3 ILSCSTF IPTS 1 ICTS 2E, 7K ICLAS 1E, 2B, 2D, 2F
Take Home labs 5% 50 pts 21 Sept.	Performance requires the students to conduct long term laboratory activities that necessitate daily data collection. The activities relate to weather and an experiment involving osmosis and include integration with internet resources and health sciences.		ACIE 2.2 ILSCTF-ELE 1,4, 9, 12, 15 IPTS 1, 4 ICTS 3A, 3D, 6A, 8D
Field Trips 10% 100 pts TBA	Performance includes interaction with outside agencies to enhance educational experiences for all students. Activities at the nature centers include the integration of handicapped students into the learning environment, investigating		ACIE 2.2, 3.2, 3.4 ILSCTF-ELE 1, 4, 9, 12, 15 IPTS 1, 3, 4, 6, 9 ICLAS 2H, 2B, 3B

	environmental education, and methods of incorporating field studies as an integral part of the science curriculum.		

Detailed instructions and expectations for each assignment will be provided by each individual instructor in his/her course syllabi.

Grading Scale: A=100-92%; B=91-83%; C=82-74%; D=73-65%; F=below 65%

COURSE OUTLINE

Week 1	What is Science? Conceptions of Scientist & Science Attitudes Science Process Skills & Activities, National Science Education Standards & Illinois Learning Standards Science Content: Life Science, Physical Science, & Earth & Space Science
Week 2	Science Process Skills & Activities using The Learning Cycle Model, Constructivism
Week 3	Science Process Skills & Activities using The Learning Cycle Model, Inquiry Based Learning
Week 4	Science Process Skills & Activities using The Learning Cycle Model, Authentic Assessment
Week 5	Science Process Skills & Activities using The Learning Cycle Model, Misconceptions
Week 6	Student Team Presentations using The Learning Cycle Model
Week 7	Student Team Presentations using The Learning Cycle Model
Week 8	Student Team Presentations using The Learning Cycle Model
Week 9	Science Process Skills & Activities using The Learning Cycle Model
Week 10	Science Process Skills & Activities, The Importance of Questioning
Week 11	Science Process Skills & Activities, Scope & Sequence Charts Science Concepts Developing Clarity of Learning (The Essential Understanding: Understand, Know, Be Able to Do—skills)
Week 12	Science Process Skills & Activities using The Learning Cycle Model
Week 13	Demonstration Lessons (Discrepant Events) Other Science Teaching Strategies Simulations Project Based Learning
Week 14	Resources Available for Teachers

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Adams, D, & Hamm, M. (1998). *Collaborative inquiry in science, math, and technology*. Portsmouth, NH: Heinemann.

Baker, D., & Piburn, M. (1997). *Constructing science in middle and secondary classrooms*. Boston: Allyn & Bacon

Beisenherz, P., & Dantonio, M. (1996). *Using the learning cycle to teach physical science: A hands-on approach for the middle grades*. Portsmouth, NH: Heinemann.

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Bloom, B. S. (1956). *Taxonomy of educational objectives: The classification of educational goals, Handbook I: Cognitive domain.* New York: Longmans Green.

Blosser, P. (1991*). How to ask the right questions.* Washington, DC: National Science Teachers Association.

Brooks, J. G., & Brooks, M. (2001). *In search of understanding: The case for constructivist classrooms* (2nd ed.). Alexandria, VA: Association for Supervision and Curriculum Development.

Bruner, J. S. (1961). The act of discovery. *Harvard Educational Review*, 31, 21-32.

Campbell, B., & Fulton, L. (2003). *Science notebooks: Writing about inquiry*. Portsmouth, NH: Heinemann.

Carin, S., & Sund, R. (1989). *Teaching modern science* (5th ed.). Columbus, OH: Merrill Publishing Company.

Carin, A. (1993). *Teaching science through discovery* (7th ed.). New York: Merrill Publishing Company.

Cerullo, M. M. (1997). *Reading the environment, children's literature in the science classroom.* Portsmouth, NH: Heinemann.

Cordeiro, P. (1992). Whole *learning, whole language and content in the upper elementary grades*. Katonah, NY: Richard C. Owen Publishers, Inc.

Doris, E. (1991). *Doing what scientists do: Children learn to investigate their world*. Portsmouth, NH: Heinemann.

Dunn R., & Dunn K. (1975). Finding the best fit- learning styles, teaching styles. *NAASP Bulletin, 59*, 37-49

Esler, W., & Esler, M. (1989). *Teaching elementary science* (5th ed.). Belmont, CA: Wadsworth Publishing Company.

Finson, K. D., Beaver, J. B., & Cramond, B. L. (1995). Development and field test of a checklist for the draw-a-scientist test. *School Science and Mathematics, 95*, (4), .

Fleer, M., Hardy, T., Baron, K., & Malcolm, C. (1996). *They don't tell the truth about the wind.* Portsmouth, NH: Heinemann.

Hein, G., & Price, S. (1994). *Active assessment for active science: A guide for elementary school teachers.* Portsmouth, NH: Heinemann.

Hixson, B. K. (1999). *Women in science rule*. Sandy, UT: Loose in the Lab, Inc.

Howe, A., & Jones, L. (1998). *Engaging children in science*. Upper Saddle Hall, NJ: Prentice-Hall, Inc.

Johnson, R.T. & Johnson, D.W. (1991). So what's new about cooperative learning in science? *Cooperative Learning, 11* (3), 2-3

Manning, M., Manning, G., & Long, R.. (1994). *Theme immersion: Inquiry-based curriculum in elementary and middle schools*. Portsmouth, NH: Heinemann.

Marek, E. A. & Cavallo, A. M. L. (1997). *The learning cycle: Elementary school science and beyond.* Portsmouth, NH: Heinemann.

Moyer, R. H., Hackett, J. K., & Everett, S. A. (2007). *Teaching science as investigations: Modeling inquiry through learning cycle lessons.* Upper Saddle River, NJ: Pearson-Merrill Prentice Hall.

National Research Council. (1993). *National science education standards*. Washington, DC: National Science Teachers Association.

Norton-Meier, L., Hand, B., Hockenberry, L. & Wise, K. (2008). *Questions, claims, and evidence: The important place of argument in children's science writing.* Portsmouth, NH: Heinemann.

Ostlund, K. L. (1992). *Science process skills: Assessing hands-on student performance*. Menlo Park, CA: Addison Wesley.

Piaget, J. (1954). *The construction of reality in the children.* New York: Basic Books.

Pearce, C. R. (1999). *Nurturing inquiry, real science for the elementary classroom.* Portsmouth, NH: Heinemann.

Russell, H. R. (1990). *Ten-minute field trips: A teacher's guide to using the school grounds for environmental s*tudies (2nd ed.). Washington, DC: National Science Teachers Association.

Saul, W., & Jagusch, S. A. (1991). *Vital connections, children, science, and books.* Portsmouth, NH: Heinemann.

Saul, W., & Reardon, J. (1996). *Beyond the science kit: Inquiry in action.* Portsmouth, NH: Heinemann.

Slavin, R. L. (1995). *Cooperative learning.* Boston: Allyn and Bacon.

Strassenburg, A. (1996). *A perspective on reform in mathematics and science education.* Eisenhower National Clearinghouse for mathematics and Science Education. Columbus, OH: National Science Teachers Association.

Tierney, B. & Dorrah, J. (2004). *How to write to learn science* (2nd ed.). Arlington, VA: NSTA Press.

Vasquez, J. (2008). *Tools & traits for highly effective science teaching, k-8.* Portsmouth, NH: Heinemann.

Zemelman, S., Daniels, H., & Hyde, A. (2005). *Best practice: Today's standards for teaching and learning in America's schools* (3rd ed.). Portsmouth, NH: Heinemann.

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Students with Disabilities: If you have a documented disability and wish to discuss academic accommodations, please contact the Office of Disability Services at 581-6583.

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Revised Spring, 2009