

**EDU 343 Science Methods**  
**Fall 2009**  
**8:00-9:30 TR GRNT 400**

Donna M. Plummer, Ph.D.  
Office: 314 Grant Hall

E-mail: donna.plummer@centre.edu  
Phone: Ext. 5308

Office hours: M 1:00-3:00; T 9:40-10:40; W 10:20-11:20; TR 1:00-2:00  
Every attempt will be made to notify students of any required changes to office hours due to mentoring intern teachers or attending professional conferences or other meetings.

**REQUIRED READING:**

Elementary

Fathman, A. K., & Crowther, D. T. (Eds.). (2006). *Science for English Language Learners*. Arlington, VA: NSTA Press.

Michaels, S., Shouse, A. W., & Schweingruber, H. A. (2008). *Ready, set, science!* Washington, DC: National Academies Press.

Secondary

Hassard, J., & Dias, M. (2005). *The art of teaching science: Inquiry and innovation in middle school and high school*. New York: Routledge.

Texley, J., Kwan, T., & Summers, J. (2004). *Investigating safely: A guide for high school teachers*. Arlington, VA: NSTA Press.

Elementary and Secondary

Barman, C. R. (1989). *An expanded view of the learning cycle: New ideas about an effective teaching strategy* (Monograph and Occasional Paper Series #4).

Washington, D. C.: Council for Elementary Science International.

Additional assigned readings

**Course Description:** Designed to prepare students to teach science in schools. Topics include national standards, science concepts, resources including the use of technology, instructional strategies and assessment of student knowledge and skills, and integration of science with other content areas. A field component is required. Prerequisite: EDU 336 or EDU 335 and admission to the Education Program.

**Course Goals:**

The general goals of this course include:

1. To prepare students to teach science content in the elementary or secondary classroom by building on the planning and teaching skills foundation established in previous education courses.
2. To further students' professional preparation as a teacher decision maker including components of the Phase 3 Portfolio.

**Course Objectives:**

As a participant in this course the student will:

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1. Participate in a classroom field experience.
2. Reflect upon, write about and discuss classroom field experiences.
3. Plan, teach and evaluate lesson(s) in the elementary or secondary science classroom in the context of the National Science Education Standards and Kentucky state standards (Academic Expectations, Core Content, Program of Studies and Depth of Knowledge).
4. Assess student achievement related to lesson plan objectives.
5. Design safe laboratory experiences engaging diverse students in the use of science process skills.
6. Develop science teaching competencies (wait time, inquiry, learning cycle) based on science education research.
7. Develop classroom management skills necessary for teaching in the science classroom.
8. Read, analyze, and discuss readings including the class text and journal articles in science education and the science content areas.
9. Demonstrate knowledge of the relationship between science and other academic content areas.
10. Develop awareness of science careers.
11. Prepare components of the Phase 3 Portfolio of the Centre College Framework.

### **Course Requirements and Evaluation**

- Readings include text and related articles. Students will also evaluate a science text on the KDE approved list in the preparation of lessons.

- Clay Animation Film Project 15%

In assigned teams of two (NE & DF; LM & JM; EB & JN), students will prepare a clay animation film elucidating science content (other than butterfly or frog metamorphosis).

- Scientist (Auto)Biographies 5%

Students will read one book from the *Scientists in the Field* series. A picture book on the life of a scientist who represents an underrepresented group such as a person of color or a woman will also be read. A 2-3-page review and analysis will evaluate the books and the potential use with students. Books are available in the Centre College library juvenile collection. (Secondary will evaluate the picture book for use by middle/high school students in an elementary mentoring program.)

- Science Game Construction 15%

Students will create, devise and construct a game appropriate for use in the classroom. Past students have utilized these games during their student teaching term.

- Classroom Lesson Plans and Teaching 20%

(elementary) Student teams of two will prepare and teach a science activity at the Toliver science day. Groups will prepare one lesson plan (5%). In addition, each student will also teach (and record) a science lesson independently. Individual students

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will prepare a lesson plan and an analysis of student work assessment including a scoring guide and scored student work (15%).

(secondary) Students will prepare a TPA overview and assessment table (5%), 3 sequential lessons (5%), recorded lesson, and analysis of student work (10%).

- Reflections 10%

Students will write a reflection on the recorded science lesson (5%). A second reflection will relate to some aspect of the science classroom (5%).

Use of standard grammar and punctuation, standard font and font size, and one-inch margins are expected of all written work. Any unoriginal work must be cited with the source and page number. The use of quotes should be minimal. Papers should be logical and focused rather than rambling and disjointed. Connections to class discussion, personal experiences and other readings are expected as a result of reflection. A paper not meeting these criteria will not earn a grade of A.

- Exams 35%

Exam I (15%) will include the evaluation of a science content-related children's book (elementary) or journal article (secondary) and Exam II (20%) will include a critical analysis of a current (2009) journal article on teaching science content. Both exams will be composed of open response and objective questions.

### Invitation to Students

This class offers the opportunity to become a member of a community of learners. For the greatest benefit, a commitment is required on the part of every member.

Academic commitment is evident when students choose to prepare for class so that they can participate in class discussions and activities. Each student has a responsibility to read assignments before class. Such participation is essential to the success of this course. If at all possible, *assignments should be submitted when due*. Conferences with the professor regarding late assignments will determine deductions.

Students also commit personally to the class by attending every class and arriving on time with personal business conducted prior to arrival. Cell phones are turned off and caps removed prior to class. The professor expects notification of excused absences. The Student Handbook explains the college absence policy of a maximum of two excused absences. *Unexcused absences will reduce the final average.*

### Grading Scale

A	93-100	B+	87-89	C+	77-79	D	62-69
A-	90-92	B	83-86	C	73-76	U	below 62
		B-	80-82	C-	70-72		

Numerical grades that fall between letter grades will be rounded to the nearest whole number. For example, 89.3 is a letter grade of B+ and 89.6 is a letter grade of A-.

**Centre College Policy Regarding Students with Physical or Learning Disabilities (from the Associate Dean's office)**

Students with physical impairments and learning disabilities will sometimes need accommodations to help them have an equal opportunity to learn. These can include seating location preferences, permission to tape lectures, and extra time on tests and other assignments. Federal and state laws require the College to provide reasonable accommodations to students with documented disabilities who request such accommodation. Whatever accommodations are provided, if any, should be the result of a discussion among the student, the professor, and the College's disabilities services coordinator, Mary Gulley. In order to encourage early discussion of these issues, the following reminders are offered:

1. Centre is committed to making its programs accessible to students with disabilities.
2. In the higher education setting, it is the student's responsibility to inform the College of any disabilities for which he or she seeks accommodation.
3. The College has designated as the beginning point of this process its disability services coordinator, Mary Gulley. She is charged with reviewing all documentation of disabilities and with coordinating any accommodations offered to students.
4. A faculty member will likely not know of a student's disability unless the student or the disability services coordinator discloses the disability.
5. If you wish to seek any accommodations for disabilities, you must initiate the process right away, for relief cannot always be granted at the last minute and will not be granted after the fact.

**Academic Dishonesty** (From the Centre College Student Handbook)

A high standard of academic honesty is expected of students in all phases of academic work and college life. Academic dishonesty in any form is a fundamental offense against the integrity of the entire academic community and is always a threat to the standards of the College and to the standing of every student. In taking tests and examinations, doing homework or laboratory work, and writing papers, students are expected to perform with honor. In written and oral work for college courses, students will be held responsible for knowing the difference between proper and improper use of source materials. The improper use of source materials is plagiarism and, along with other breaches of academic integrity, is subject to disciplinary action. It is the responsibility of any faculty member who has a concern about academic dishonesty to report it to the Associate Dean, who then assumes responsibility for the case.

### Schedule of Topics and Readings

Note: Journal articles are available on the Centre College Grace Doherty Library Electronic Journals webpage and the EDU 343 WebCT site.

Date	Topic/Assignment	Elementary Article(s)/ Process Skills; Text Readings	Secondary Article(s)/Process Skills; Text Readings
1 Sept	Introduction—Attitudes National Science Education Standards KY Core Content & Academic Expectations Process Skills--Classification		
3 Sept	What is Science? Science Inquiry Clay Animation Software Introduction	Ch. 2 ELL Ch. 9 Farland-Smith & McComas Ostlund (Handout)	Ch. 1 Inquiry Ostlund (Handout)
8 Sept	Temperature Rocks <b>Bring Rocks, Fossils, or Minerals Book from JUV Collection</b>	Ch. 3 Betteley Lark Urban-Rich	Ch. 3 Student- vs. Teacher-Centered Classrooms
10 Sept	Temperature Fossils	ELL Ch. 1, 2	<u>8:30 AM</u> IS Ch. 7 <u>9:40 AM</u> Ch. 7 Adolescents
15 Sept	Why Teach Science? Science Education Journals <i>Science and Children</i> and <i>Science Teacher</i> Analysis & Evaluation <b>Bring Scientist Books</b> <b>Scientist Bio Paper Due</b>	Ch. 1 Wilford	Ch. 4 History of Sci Education Sullivan

17 Sept	Motion	ELL Ch. 4 Ohana Rhea	<u>9:40</u> Ch. 5 Curriculum Bircher
22 Sept	Planning	Ch. 7 ELL Ch. 3 Wilmes	Ch. 9 Unit Design Wilmes
24 Sept	Electricity	Preston	<u>9:40</u> Ch. 12 Internet
29 Sept	Energy, Light & Plants	ELL Ch. 7 Learning Cycle (Barman)	Ch. 8 Models of Teaching Learning Cycle (Barman)
1 Oct	Assessment	Ch. 6 Beckstead	Ch. 10 Assessment
6 Oct	<b>Science Games Due</b>	NSTA Outstanding Science Trade Books (online)	NSTA Outstanding Science Trade Books (online)
8 Oct	Assessment continued	ELL Ch. 5 App. B, C	<u>9:40</u> IS Ch. 1, 2, 3, 4 Brookhart, et al.
13 Oct	pH & Nutrition Chemistry Safety Issues	Ch. 4 Roy Wallace	IS Ch. 5, 6
	<b>FALL BREAK 15-16 October</b>		
20 Oct	Acceleration <b>Reflection 1 Due</b>		IS Ch. 8
22 Oct	Curriculum Materials Science Textbooks <b>Bring AIMS Book from Library Curriculum Collection</b>	ELL Ch. 8 (omit pp. 135-172)	Ch. 6 STS
27 Oct	<b>Exam I</b>	Including Children's Book Evaluation	Including Emdin article Evaluation

29 Oct	Curriculum Materials continued	Ch. 5 Hapgood & Palincsar	<u>9:40</u> Ch. 2 Global/Multicultural/ Gender
3 Nov	Force Conductivity—Water Hardness <b>Individual Lesson Recording with Lesson Plan, Student Assessment, Analysis of Student Work, and Reflection Due by 4 PM Friday 6 November</b>	ELL Ch. 6	
5 Nov	Sound		<u>9:40</u> Ch. 11 Critical Thinking Perkins-Gough
10 Nov	Astronomy Water Environment <b>Bring Water or Environmental Book from JUV Collection</b>	Comstock LeDee, et al.	IS Ch. 9 Englert, et al.
12 Nov	<b>Clay Animation Films</b> Screening with Discussion		
17 Nov	Magnets & Magnetic Field Weather <b>Reflection 2 Due</b>	Evans Seimears, et al.	IS Ch. 10, 11 Evans
19 Nov	Physical and Emotional Environment	ELL Ch. 10 Council for Exceptional Children	Melber & Brown
24 Nov	Physical Education and Human Body <b>Human Body Ellison Dies</b>	ROC, Vol. 2 Lyman, p. 149 Menear Royce	Concannon, et al. (2009) ROC, Vol. 2 Lyman, p. 149
	<b>THANKSGIVING HOLIDAY</b>		

	<b>25-29 November</b>		
<b>1 Dec (Tues)</b>	Human Body continued <b>Phase 3 Portfolio (except Peer Evaluation) Completed by 4:00 PM</b>	Ch. 8 Abell & Lee (for final)	Concannon & Brown (2008) (for final) Sorgo
<b>3 Dec (Thurs)</b>	Plant & Animal Adaptations Life Cycles Course Evaluation <b>Phase 3 Portfolio Peer Evaluation Completed by 12:00 PM</b>	ROC, Vol. 1 Cloues, p. 97 Plummer, MacShara, & King Scribner-MacLean & McLaughlin Talley	ROC, Vol. 1 Cloues, p. 97 Talley
<b>9 Dec</b>	<b>FINAL EXAM (including journal article evaluation)</b>	<b>Monday 1:30-4:30 AM</b>	

**NOTE:** This syllabus may be modified as the term progresses in order to meet the course objectives and student needs.