

6. http://www.nap.edu/catalog.php?record_id=12190#toc National Research Council (2009). *Learning science in informal environments: People, places and pursuits*. Washington, DC: National Academy Press.
7. Additional links can be found on our course ELMS page.

Course Objectives

(Coded for the ACEI and InTASC Standards, the EDCI Elementary Education Program Assessment: Science Education Booklet V (EDCI), the Maryland Teacher Technology Standards, (MT), and the Asia Society Global Competency Teacher Standards (AS)

By the end of the semester you should be able to:

1. Assess individual differences through a variety of formal and informal techniques and links that assessment with the goals and assessment for science instruction (grades 1-6) as articulated by the *Standards* documents (ACEI 4.0, InTASC 6, EDCI A.1, A.4. C.1, C. 2).
2. Design instruction for student diversity (cultural, gender, and ableness) (ACEI 3.2, InTASC 2, EDCI A.3).
3. Design, teach, and reflect on inquiry based science content lessons (ACEI 2.2 and 3.1-5, 5.1-5.2, InTASC 4, EDCI B.1).
4. Design lessons that make connections across the curriculum (ACEI 3.1 and 5.1, InTASC 7, EDCI B.2).
5. Adapt meaningfully science curricula materials and instructional strategies as the classroom situation changes (ACEI 5.1, InTASC 8, EDCI B.4).
6. Demonstrate skills in designing appropriate science instruction adjusted to accommodate individual differences in specific social contexts/communities (ACEI 3.1, InTASC 2 , EDCI A.1, A-3).
7. Use a variety of media communication tools, including audio-visual aids and computers (EDCI B.3, MT 2,4,5, and 7).
8. Aware of world events and global dynamics and uses activities that address authentic local and global issues, **particularly sustainability** (InTASC 5, Asia Society GCTS, #4).

The Vision And Mission

The College of Education (COE) at the University of Maryland, College Park (UM) envisions a world where every individual has equal access to life-long learning and opportunities for healthy development and where each person's distinct abilities are nurtured from potential to achievement (COE Strategic Plan, p 3). We aim to prepare accomplished beginning and advanced-level professionals who can advance the learning and development of their students and who are ready to become leaders in their fields.

Our mission is to foster the learning and development of PK-16 students through our educator preparation programs, leadership, research, advocacy, and partnerships. We aim to prepare educators with the skills and commitments necessary to ensure equity for all students in the public schools and classrooms they will lead. This mission, which reflects an overarching

emphasis on ***Excellence and Equity***, serves as the foundation for the COE conceptual framework.

The COE is dedicated to rigorous evidence-based research, free and open debate, shared governance, responsibility to the surrounding community and participatory democracy. It is a place whose academic vitality and capacity to serve others flow from, and are nourished by, its core values: diversity and equity, innovation and creativity, internationalization, and policy engagement.

Conceptual Framework Candidate Proficiencies

The COE requires that all graduates demonstrate these four core proficiencies:

- 1) Candidates demonstrate competency in their knowledge of subject matter, curriculum, pedagogy as well as pedagogical content knowledge.
- 2) Candidates demonstrate understanding of learners and their social and cultural contexts with a global perspective and intentional sensitivity to other cultures.
- 3) Candidates practice evidence-based decision-making through the use of assessment as well as the critical interpretation of research and inquiry in order to improve educational practice.
- 4) Candidates competently integrate technology in instruction to support student learning and develop data-driven solutions for instructional and school improvement.

College of Education Conceptual Framework

The COE sees three critical domains of teacher and educational leader preparation as key to helping us achieve the goals set forth ***Commitment, Knowledge, and Practice***.



Brief Descriptions of Activities/Assignments

Note: All due dates are listed on the attached calendar. The assignments are keyed to the performance standards specified in the Elementary Education Performance Assessment: Science Education (Booklet V)

1. Professionalism (20 points)

- Class Discussions of Readings

Throughout the semester, you are asked regularly to read selections of your textbooks and other written materials and be prepared to discuss them in class. This assignment addresses standards ACEI 2.3 and 5.1, InTASC 9, EDCI A.1. and A.4.

- Ongoing Reflection (20 pts)

Throughout the semester, you are asked to keep a journal in which you record your thoughts and feelings associated with teaching/learning science appropriate for elementary students. To assist you in this assignment, you will be given five questions throughout the semester on which to comment. A key resource for these questions will be your course textbook. Additional entries are recommended *but are not required*. Your journal responses will be turned in for assessment on the day they are due. This assignment addresses standard ACEI 2.3 and 5.3, InTASC 9, EDCI B.3.

2. Peer Conversations about Teaching/Learning Science (15 pts each; 30 points total)

The purpose of these two small peer group, active teaching, cooperative teaching experiences is to help you develop confidence and experience in teaching science topics for understanding before you attempt them with diverse elementary students in schools. Two times this semester (the first session will focus on physical science, and the next session you will choose from either life science, or earth/space science) you will engage in a conversation with a small learning group of your peers in which you describe how you would teach a specific science activity that you find in your school's science curriculum or from other sources to elementary learners. You will be expected to enhance the activities you find with ideas that we discuss in this course (i.e., make a significant effort to make connection with the learners' interests and prior knowledge, incorporate technology, be inclusive, **and consider sustainability issues**) and to actively involve your peers by allowing them to see, to try out, and comment on the manipulatives included in your activity. A lesson plan (in the 5 E format) is due on the day that you are scheduled to present your lesson. After each peer conversation, you will engage in a short structured conversation with your peers on the lesson. A written reflection on the experience will be turned in for review. This assignment addresses standards ACEI 2.2, 3.1-3.5, 5.2, InTASC 7, EDCI B.1, B.2, B.3, B.4, AS 4

3. Science Lesson Assignment (50 pts)

Early in the semester, consult with your mentor teacher and select a science topic that you will be able to teach near the latter part of this semester (with either a small group of elementary students or with the whole class, whichever fits your placement situation, consult with your mentor teacher, and your professional development needs. You will need to turn in a word processed commentary that includes 5 sections: (a) the lesson plan, (b) rationale for the instructional focus, c) any supplemental materials used in the lesson, (d) a self-assessment of your facilitation of the lesson, and (e) your mentor teacher's completed and signed scoring instrument. Each section is elaborated upon below.

- (a) **The lesson plan**
The lesson does not have to be an original lesson that you design. You may choose to teach a science lesson present in your county's science curriculum guide (or any other science lesson that you and your mentor teacher determine to be appropriate, including an original one). However, you are responsible for what is in your lesson plan and your lesson must be formatted to align with the 5 E model. In addition to the 5 E components, it also should include the following elements: (a) objective of the lesson and rationale for the objective; (b) materials needed; (c) lesson procedure; (d) method of assessing impact of the lesson on students' learning (selective response and BCR).
- (b) **Rationale for the instructional focus**
EDCI 372 is designed to inform you of the most current thinking concerning research-based recommendations for effective science instruction for grades 1 to 6, components including: planning, delivery, and assessment. Two research-based recommendations made are for teachers to know both the science content of their lesson and their students' understanding and interest regarding the selected science topic *before* instruction. To show evidence that you have been guided by this research-based recommendation, for this section you are to prepare a 3-4 page document that:
1. Summarizes the scientific understanding of your topic (provide at least two references) in a one to page summary.
 2. Describes the background of three students that you select to interview about the science topic before you have planned your instruction (identify what you believe distinguishes them as individuals, such as their academic level, gender, and ethnic/cultural background). One of the students must be new arrival to the U.S. or someone whose family has arrived from another part of the world.
 3. Includes the list of interview questions (the protocol) you used to interview the three students (individually).
 4. Presents in a separate paragraph for *each* student what you believe each student knows about the topic based on your interpretation of the interview responses.
- (c) **Any supplemental materials used in the lesson**
Please turn in for review any supplemental materials that you used in your lesson (e.g., a reading selection or a data collection sheet). Science equipment or manipulatives should be identified and described in your lesson plan only (they are not turned in for review).
- (d) **A self-assessment of your facilitation of the lesson,**
This would include your assessment of how you managed an active learning environment, how you engaged in inquiry and reflection throughout, how you assessed individual differences (planning and delivery), to what extent you believe you provided effective instruction, how and to what extent of success your lesson integrates across subject areas, how in your lesson you adjusted to changing conditions, assessed student progress, and made it possible for your students to become aware of world events and global dynamics from a scientific perspective. Your self-assessment should be guided by the standard indicators

identified in the EDCI Science Performance based Standards I. C, I. E, V. A.1, V. B 1, V. B. 2, V. B. 4, V. C. and AS 4.

This assignment addresses standards EDCI Science Performance based Standards ACEI 2.2, 3.1-3.5, 4.0, InTASC 2,3,4,5,6,7, 8, 9, EDCI A.1, A.2. A.3, A.4, B.1. B.2, B.3, B. 4., C.1, C. 2., MT 2.3.4.7, and AS #4.

- (e) Your mentor teacher's completed and signed scoring sheet.

Evaluation

I will provide written feedback at intervals throughout the course based on the quality of your contributions in class and the thoughtfulness of your written work. I will also take into account your own assessment of your professional development in science teaching/learning. In addition, I will invite you to provide feedback about the course at intervals throughout the semester.

Components

1. Participation

Ongoing reflection through journal writing (20%)

2. Peer Conversations of Science Teaching/Learning (30% total)

3. Science Lesson Assignment (50%, total)

Instructor's Performance Assessment (40%)

Mentor Teacher's Performance Assessment (10%)

Grades

A+ 100%-99%	B+ 89-88%	C+ 79-78%	D+ 69-68%	F <59%
A 98-92%	B 87-82%	C 77-72%	D 67-62 %	
A- 91-90%	B- 81-80%	C 71-70 %	D- 61-60 %	

Documented Disability Disclosure

In compliance with *and in the spirit of* the Americans With Disabilities Act (ADA), I would like to work with you if you have a documented disability that is relevant to your work in this course. If you wish to discuss academic accommodations, please contact me within the first two weeks of the semester.

Additional Important Information

1. Attendance and Professional Conduct

Your participation is a vital aspect of this course. Please make a reasonable effort (an email the instructor is preferred) to bring to the instructor's attention ahead of time any conflict between class meeting times and other commitments/circumstances (e.g., religious observations, medical appointments, or illness), so that additional arrangements can be made. For missed class sessions when an assignment is due, upon returning to class it is required to bring documentation of the illness, signed by a health care professional. You may connect to the Internet on your laptop, tablet, or Smartphone during class sessions to assist you with your class activities. However, please be considerate and do not check email, Facebook, or engage in any way with social media, since they distract from instruction. Also please be respectful with the use of cell phones

(e.g., set to vibrate during class, refrain from texting) and put them away during class session.. Thank you for your cooperation.

2. University Honor Code

The University of Maryland, College Park has a nationally recognized Code of Academic Integrity, administered by the Student Honor Council. This Code sets standards for academic integrity at Maryland for all undergraduate and graduate students. As a student you are responsible for upholding these standards for this course. It is very important for you to be aware of the consequences of cheating, fabrication, facilitation, and plagiarism. For more information on the Code of Academic Integrity or the Student Honor Council, please visit

<http://www.studenthonorcouncil.umd.edu/whatis.html>”

3. Student Course Evaluations

As a member of the UMD academic community, as a student you have an important responsibility to submit your course evaluations each term through *CourseEvalUM* in order to help faculty and administrators improve teaching and learning at Maryland. The link through which you can access the evaluation system is: www.courseevalum.umd.edu. Once you submit your electronic evaluations, you can access all posted results via *Testudo* under *CourseEvalUM Reporting*. More information on the electronic evaluation system is available at:

https://www.irpa.umd.edu/Assessment/CourseEval/stdt_faq.shtml.

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EDCI 372 A: Elementary Science Methods
 Dr. R. McGinnis, University of Maryland, College Park

Calendar

Note: The readings are due on the day they are cited in this schedule. This schedule is subject to change based on the progress and needs of the class.

Class Sessions Topic

- Session 1** Reflecting upon Science Learning/Teaching Experiences
 Outdoor Science Education
 Course Overview
- Session 2** Informal Science Education Excursion to the Smithsonian National
 Zoological Park
- Session 3** Scientific Teaching Practices (Part One)
 The learning cycle/ 5 “E” lesson plan model; safety
Reading: B&P, Chapter 3
Due: 1st Journal Writing Response.
- Session 4** Scientific Teaching Practices (Part Two)
 Demonstrations, the well-designed scientific investigation
Reading: Buxton and Provenzo, Jr. (B&P), Chapters 1, 2 (pp.49- 55, only)
Due: 2st Journal Writing Response.
- Session 5** Learners’ Understandings in Science:
 Alternative Conceptions and Science Talks
Reading: B&P, Chapter 4
Due: 3rd Journal Writing Response.
- Session 6** Global Science Education
 Guest Presentation “Teaching of Science in Outside the USA”
- Session 7** First Hour: Elementary sciencing: Life science
 Reading: B&P, Chapter 7
 Second Hour: Making Connections Between Science and Other Subjects:
 Reading and Language Arts
Due: Peer Conversation materials #1 (Life Science)
- Session 8** Informal Science Education
- Session 9** Elementary sciencing: Physical Science and/or Earth/Space science
Reading: B&P, Chapters 6, 8, 9

Due: Peer Conversation materials #2 (Physical Science or Earth/Space Science)

Session 10
Education

Global Science Education --**Sustainability**¹/ Sensitive Issues in Science

The Case of Climate Change Education

Reading: B&P, Chapter 2 (pp. 46-48, 57-59)

Due: 4th Journal Writing Response

Session 11

Lifelong Professional Development in Science Education Influenced by Policy
Course Debriefing

Reading, B&P, Chapter 5

Due: 5th Journal Writing Response (written in the class session)

Due: Science Lesson Assignment

¹ Integrating the theme of sustainability into the course and especially this class session is the result of my participation in the Chesapeake Project workshop sponsored by the University of Maryland (www.sustainability.umd.edu/index.php?p=chesapeake_project). The goal of the workshop was to encourage university faculty to address issues of sustainability in their courses and across a variety of academic disciplines. My aim in this course is to connect the topic of sustainability with climate change education.