Northern Kentucky University
College of Education and Human Services
EDU 308
Science in the Elementary Classroom, 3 Credit Hours
Tuesday & Thursday
9:25-10:40 (Section II)
10:55-12:10 (Section I)
MEP 185
Spring 2017

Learn, Lead, Succeed

Mission
The College of Education and Human Services plays an important leadership role and collaborates with others in the creation, dissemination, and application of knowledge and research that enhances professional practice and transforms lives, schools, and communities.

Vision
The College of Education and Human Services aspires to be known throughout the Commonwealth of Kentucky and region at large as the leader in providing opportunities for engaged learning and applied scholarship that fosters individual growth and collective success.

Kentucky Core Academic Standards (KCAS)
Preparation of Kentucky's students for the demands of the 21st century requires districts and schools to prepare every student for successful transition to be College and Career Ready. The Kentucky Core Academic Standards help ensure that all students throughout Kentucky are provided with common content and have opportunities to learn at high levels. As education candidates complete and implement projects and assignments throughout their education programs at NKU, they will incorporate the components of the Kentucky Core Academic Standards.

Professor: Dr. Patricia Bills
Office: MEP 275
Telephone: (859) 572-7974
Office Hours: Tuesday & Thursday 12:15-1:30; Wednesday 12:00 – 3:00; and by appointment

Email: billsp1@nku.edu

Required Textbook and/or Materials:

- Campbell, B., & Fulton, L. (2014). *Science Notebooks: Writing About Inquiry*. 2nd Edition. (ISBN 978-0-325-05659-3)
- Bybee, R. (2015). *The BSCS 5E Instructional Model: Creating Teachable Moments*. NSTA Press. (ISBN 978-1-941316-00-9)
- A small notebook to use for journaling/note taking during science investigations.
- There will be other readings which I will provide on Blackboard in PDF form.
- Enroll in a free membership to the National Science Teachers Association (NSTA) Learning Center site. http://learningcenter.nsta.org/ *This site will provide you with many resources for lesson plans that are approved by the professional science education association.*

  Option: *I also suggest you get a one-year student membership at $35. This membership will provide you with a year's worth (9 issues) of the best elementary science journal for teachers, Science and Children, a 20% discount on NSTA books, as well as access to hundreds of lesson ideas and content resources. It is completely worth your money to be a member, but optional for this class.*

Course Description:

Hours: 3 classroom + 0 lab/studio
Prerequisites: One biology course with lab and one physical science course with lab or SCI 110 and SCI 111 (each with a minimum grade of C); satisfactory completion of Professional Semester I; admission to the teacher education program.
Co-requisites: EDU 306, EDU 315, EDU 312, and EDU 392.
Taught: Fall and spring

Theory, content, and instructional strategies for teaching elementary school science with an emphasis on inquiry-based methods.

Student Learning Outcomes, Assessment and Standards Alignment (This table should demonstrate the alignment between measurable student learning outcomes (SLO) for the course, the specific assignments that will be used to assess these SLOs, and the connection to applicable standards.)

Student Learning Outcome[1]	**Assessment (Assignments)**	**Kentucky Teacher Standards (Initial) (Advanced) (IECE)**	**InTASC Category**	**KFfT Domains**	ACEI Standards
1) Appropriately apply Next Generation Science Standards to instructional plans	STEM Day Project Midterm Exam Final Exam	1.1, 1.2, 1.3, 1.4 2.1, 2.2, 3.3 4.1, 4.2, 4.5 5.4, 5.6	1, 2, 3, 4, 5, 7, 8	1A 1B 1E 3C 3E	2.2, 3.1, 3.2, 3.3, 3.4, 3.5

[1] There are currently no NSTA SPA Standards for elementary science.

and meaningful STEM experiences for children.		6.1, 6.2			
2) Design, teach, and assess inquiry-based science activities appropriate to grade level.	NKU STEM Day Project	1.1, 1.2, 1.3, 1.4, 2.1, 2.2, 2.3, 2.4, 2.5 3.3, 3.4, 3.5 4.1, 4.2, 4.5 5.2, 5.4, 5.5, 5.6, 5.6 6.1, 6.2, 6.5	1-8	1A, C, E 2A, B, D 3A-E	1, 2.2,3.1, 3.2, 3.3, 3.4, 3.5, 4,
3) Develop and use critical thinking of research on high-quality STEM teaching.	STEM Day Project Reading Responses Classroom Participation ngSC Project Mid-term and Final Exams	1.1, 1.2, 1.3, 1.4 2.1, 2.2 9.1, 9.2, 9.3 10.1, 10.2, 10.3	4, 9	1A 4D, E	2.1
4) Demonstrate an understanding of children's developmental understandings of scientific concepts (e.g., Kindergarteners will understand ideas of force differently than 3rd graders)	STEM Day Project Classroom Participation Mid Term and Final Exams	1.1, 1.3, 1.4, 1.5	1, 2, 4, 5	1	1, 2.2
5) Collaborate with colleagues in teaching and reflect on teaching and learning experiences related to the course.	STEM Day Project Classroom Participation ngSC Project	10.1, 8.1	10	4D, F	5.1, 5.2

Course Assignments and Grading

General comments about the course design: There are two major projects this semester that will take up a good portion of our attention, but will also comprise a lot of your learning. In addition to these two projects, there are several smaller assignments that I will ask you to participate in during class, and for which I will give you participation points. In general, the course is designed to offer you a diverse collection of experiences and learning opportunities.

Note: I also am willing to give extra credit points to students who take on extra volunteer opportunities available to you this semester (see below). My goal is to provide you with opportunities to learn about inquiry-based science across multiple contexts: in class, across campus, and as a

member of the broader Northern Kentucky professional education community. While no course can adequately represent all that is available to you as a future teacher, I want to provide as much as I possibly can in the time we have together this semester. I want to recognize you for your efforts to go above and beyond the call of duty. However, I will hold you to high standards of quality and professionalism at all times, and extra credit opportunities will not be considered for students whose in-class performance is sub-par.

1) Next Generation Science Classroom (ngSC) (100 points): In partnership with CINSAM and local schools, we all will be participating in a unique project for the semester. The Next Generation Science Classroom (or ngSC) is a professional development project that takes place in local teachers' classrooms. In this project, CINSAM professional education consultants will demonstrate a science lesson in an elementary classroom, and will conduct a professional reflection discussion with several teachers who observe the live demonstration. You are required to attend one of the several offered sessions (you will sign up online), participate in the professional discussion, and write a reflection on the experience. Specifics of this reflection paper are provided in a document on Blackboard.

2) NKU STEM Day Project (100 points): On **Friday, March 24** we will all participate in NKU STEM Day. This is a day when CINSAM (The Center for Integrated Natural Sciences and Mathematics) brings 4th grade students with their teachers from schools across the area to NKU's campus to participate in many science experiences. All of us will be present and take an active role in this day. With one classmate, you will create one hands-on science activity for three rotations of a small group of 4th graders.

STEM Day In-Class Presentation (50 points): In addition to planning a presentation for STEM Day, you will present it for us in class prior to STEM Day (see dates in calendar). This presentation will provide you with a place to test the activity you have planned, and feedback from your colleagues about the project. Your grade will be determined by the rubric provided on Blackboard and the extent to which you are prepared for this presentation.

STEM Day Analysis Paper (50 points): After STEM Day, you will write an analysis paper about your learning and teaching about the STEM Day project. This paper will be more fully outlined in another document on Blackboard and discussed in class. The rubric for this writing is included in this document.

3) Children's Science Book Talk (30 points): You will find, read, and share with the class one children's science book. It can be fiction or non-fiction. Briefly explain how you might use the book to teach both science and literacy practices, as well as discuss the extent to which you think the book accurately addresses science content. You will also upload a brief written review on a discussion board in Blackboard. You are awarded points based on your in-class presentation and the quality of your written review.

4) Reading Response (24 points total): Each reading response will be comprised of three questions or prompts for you to complete prior to coming to class on the day that it is due. Questions will be made available on Blackboard approximately 7 days before the due date. Each response is worth 6 points. There will be 4 responses over the course of the semester. Consult the calendar for due dates. A scoring rubric is provided on Blackboard.

5) Mid-Term Exam (50 points): There will be one open-notes mid-term exam based on the content discussed in the first 8 weeks. It will be a combination of selected response, short written response questions, and include one longer essay analyzing a teaching scenario. This will be turned in on

Blackboard by Midnight of the due date. See calendar.

6) Final Exam (50 Points): The final exam will be a combination of analyzing a science scenario according to several concepts taught this semester, and small essay questions that help assessed what you have learned from the various readings this semester. The format for this exam is to be determined later. We will discuss it well ahead of time in class. <u>There will be no study guide for this exam, so take good notes in class and read the readings closely</u>.

7) Science Notebook (20 points): You will keep a science notebook all semester as we do science activities in class. The notebook should be a stand-alone notebook (like a composition book) or a section in a 3-ring binder that you keep notes as you do science. I will collect these notebooks at the end of the semester (see schedule), and will assign points based mostly on organization, completeness and neatness.

Name of Assignment	**Points Possible**
ngSC project paper	100
NKU STEM Day • in-class presentation (50) • analysis paper (50)	100
Science Children's Book Talk	30
Reading Responses	24
Mid-Term Exam	50
Final Exam	50
Science Notebook	20
	Total: 364

***Extra Credit:** Since I believe that learning about science also happens outside of the university setting, I would like to give opportunities for students to earn extra credit points for taking the initiative to do one of the following and write a brief report about the experience. The details of this report are handled on a case-by-case basis. Students must get permission from the instructor in writing before choosing an EC project. Students are not to do these projects in lieu of some other assignment or to make up a grade. These projects are for those who would like to have additional science experiences and who are ready to take on the extra work to do so. These will not replace the required work of the course.

Here are some possible projects:

- Volunteer in a classroom to help with science lessons outside of your practicum.
- Help a school or a local elementary classroom do some kind of service project like making a school garden, or creating a recycling program, etc.
- Volunteer at a school Science Fair night.
- Visit a local science museum or the Cincinnati Nature Center and design a field trip to that museum you might use in a future teaching opportunity (e.g., clinical experience?).
- Do a citizen science project all semester and tweet about it on our Twitter site. (see me about citizen science.)
- Make a video of yourself teaching science to your practicum students and write a reflection about it. Provide the video to me.
- Make a video of an experienced science teacher teaching a lesson and analyze it.
- Create an extra science unit on a different topic from the one you used for the course requirement.

- Do a formal curriculum review of the science curriculum in your practicum placement and determine where this curriculum meets the NGSS.
- Create and maintain a science teaching blog all semester.
- Twitter site when you post new entries so that you can have an authentic audience.

Grading Scale

The Department of Teacher Education uses a common grading scale for undergraduate and graduate courses. Note: I do not round grades up.

Grade	Percent	Points
A	95%+	
A-	93%+	
B+	91%+	
B	87%+	
B-	85%+	
C+	83%+	
C	77%+	
C-	75%+	
D+	73%+	
D	70%+	
F	<70%	

The College of Education and Human Services requires education majors to earn a grade of *C* or better in all education (EDU & EDS) courses. A grade of *C*- or lower is not acceptable for program completion.

Mid-term Grade: Mid-term grades will be posted in myNKU by the deadline established in the Academic Calendar.

Final Examination Information: See above.

Course Policies and Procedures

Attendance Policy:
Students are expected to attend every class period. This is your last semester to get the content you need to be successful with your clinical experience, and further, for your future work as a teacher. Therefore, I will hold you to the highest professional standards. I do, however, understand that life gets complicated. Therefore, I will allow you two missed classes without penalty. After two classes missed, you will need to set up a meeting with me to discuss whether you will receive an incomplete in the course. After four missed classes, whether you pass this class will be at my discretion. Additionally, the content you miss because of an absence will be up to you to learn on your own. I will not be available for private teaching sessions.

Arriving to class late and leaving early (partial attendance) count as half of an absence. If you are five minutes late to class more than once I will ask you to have a conference with me. The same is true with asking to leave class early or how early you leave, regardless of the reason. Please plan all appointments and meetings according to the calendar we have set for this semester. On the other hand, please know that I will also work with you to help you be successful if an extreme circumstance makes it so that you have to miss class often. Please come talk to me if that becomes your situation. *Please note: these policies are consistent with the NKU College of Education and Human Services Educators' Code of Ethics.*

Student Engagement and Technology Policy
This is a highly interactive and discussion intense course. I will expect you to comply with the

university and College of Education and Human Development's policies concerning your classroom behavior and show of respect of the professor and of your learning colleagues. This includes being respectful of others who are sharing ideas, listening carefully before responding, and developing ways to provide the kind of critical help you would want from a colleague. This also includes the following ideas:

As is true in all professional spaces, the expectation is that cell phones are off or in silent mode. They must be tucked into bags so that you are not tempted to check email, text messages, Facebook, etc. We are only together for 75 minutes each time. I expect that you will devote your attention to the class and to your colleagues. If you are in a situation in which you are expecting an important phone call, please step out of class to receive it.

Other technology, such as laptops and tablet devices are more than welcome as they may help you to take notes or do research. However, checking Facebook sending emails during class (unless we are using email for course purposes) is unprofessional, inconsiderate, and interferes with your learning. Please just don't do it. I reserve the right to ask students to turn off and put away electronic devices if anyone disregards this expectation.

EMAIL correspondence: I will do my best to return your emails within 48 hours of receiving them. I rarely check email on the weekend or in the evening. If you send an e-mail on Friday, you can expect a response on the following Monday unless I have indicated that I am out of the office and/or unavailable. Include the course prefix and number (EDU 308) in the subject line of the e-mail message. Also, it is expected at the university level that all emails begin with the appropriate professional greeting ("Dear Dr. Bills"), and that you maintain a professional tone at all times. *You must plan ahead if you need to contact me with time sensitive information.* If you do not hear back from me within 48 hours, please send your message again as I may not have received it.

Student Honor Code: The Student Honor Code [the "Honor Code"] is a commitment by students of Northern Kentucky University, through their matriculation or continued enrollment at the University, to adhere to the highest degree of ethical integrity in academic conduct. It is a commitment individually and collectively that the students of Northern Kentucky University will not lie, cheat, or plagiarize to gain an academic advantage over fellow students or avoid academic requirements.

The purpose of the Honor Code is to establish standards of academic conduct for students at Northern Kentucky University and to provide a procedure that offers basic assurances of fundamental fairness to any person accused of violations of these rules. Each Northern Kentucky University student is bound by the provisions of the Honor Code and is presumed to be familiar with all of its provisions. Students also should aspire to conduct themselves in a manner that is consistent with the highest degree of ethical integrity in all matters, whether covered in the Honor Code or not. The success of this commitment begins in the diligence with which students uphold the letter and the spirit of the Honor Code.

In addition, students in the education programs must also adhere to the College of Education and Human Services Code of Ethics and the Professional Code of Ethics for Kentucky School Certified Personnel.

Credit Hour Policy Statement: In accordance with federal policy, NKU defines a credit hour as the amount of work represented in the achievement of student learning outcomes (verified by evidence of student achievement) that reasonably approximates one hour (50 minutes) of classroom

instruction and a minimum of two hours of out-of-class student work. For every course credit hour, a typical student should expect to spend at least three hours per week of concentrated attention on course-related work including, but not limited to, class meeting time, reading, reviewing, organizing notes, studying and completing assignments. At least an equivalent amount of time is expected for other academic activities such as online courses, laboratory work, internships, practica, studio work and other academic work leading to the award of credit hours.

Estimates of the time required for a typical student to complete course expectations are as follows:

In accordance with federal policy, NKU defines a credit hour as the amount of work represented in the achievement of student learning outcomes (verified by evidence of student achievement) that reasonably approximates one hour (50 minutes) of classroom instruction and a minimum of two hours of out-of-class student work. For every course credit hour, a typical student should expect to spend at least three hours per week of concentrated attention on course-related work including, but not limited to, class meeting time, reading, reviewing, organizing notes, studying and completing assignments. At least an equivalent amount of time is expected for other academic activities such as online courses, laboratory work, internships, practica, studio work and other academic work leading to the award of credit hours.

Estimates of the time required for a typical student to complete course expectations are as follows:

In-Class: 2 days x 75 minutes x 15 weeks	= 37.5 hours
Readings: 1-2/week x 2 hrs x 12 weeks	= approximately 30 hours
Assignments:	= approximately 12 hours
(Notebooks, ngSC project & analysis paper, Classroom Presentation)	
Group Projects: STEM Day (3 hrs on STEM Day + 8 hrs preparation)	= 12.0 Hours
Final Exam	= 3.0 Hours
Total	**= 82 hours**

Student Evaluation of Instructor and Course: Northern Kentucky University takes Instructor and Course Evaluations very seriously as an important means of gathering information for the enhancement of learning opportunities for its students. It is an important responsibility of NKU students as citizens of the University to participate in the instructor and course evaluation process. During the two weeks* prior to the end of each semester classes, you will be asked to reflect upon what you have learned in this course, the extent to which you have invested the necessary effort to maximize your learning, and the role your instructor has played in the learning process. It is very important that you complete the online evaluations with thoughtfully written comments.

Student evaluations of courses and instructors are regarded as strictly confidential. They are not available to the instructor until after final grades are submitted, and extensive precautions are taken to prevent your comments from being identified as coming from you. Students who complete an evaluation for a particular course (or opt out of doing so in the evaluation) will be rewarded for their participation by having access to their course grade as soon as that grade is submitted by the instructor. On the other hand, any student who does not complete the course evaluation (or opt out of doing so in the evaluation) should expect to incur a two week delay in access to his or her course grade beyond the university's official date for grade availability. To complete online evaluations go to http://eval.nku.edu. Click on "student login" and use the same USERNAME and PASSWORD as

used on campus.

In addition, you should be aware of:

- Evaluations can affect changes in courses. Evaluations without comments are less valuable and less credible than those filled out thoughtfully. Comments that are expressed well are more effective than those that are not.
- Positive feedback is just as important as criticism. Moreover, negative evaluations without any explanation and specifics are not especially useful.
- Once grades are submitted, all evaluations are read not only by the instructor, but also by the instructor's department chairperson.
- Evaluations not only provide feedback to your instructor, but also provide information to the department chair for use in performance evaluations. This information affects reappointments, promotions, salaries, and teaching assignments.

Accommodations Due to Disability: Northern Kentucky University is committed to providing reasonable accommodations for all persons with disabilities. The syllabus is available in alternate formats upon request. Students with disabilities: If you are seeking classroom accommodations under the Americans with Disabilities Act, you are required to register with the Disability Programs and Services Office in SU 303. To receive academic accommodations for this class, please obtain the proper DPS forms and meet with me at the beginning of the semester. More information on Disability Services can be found at http://disability.nku.edu.

Bibliography

Bybee, R. (2015). *The BSCS 5E Instructional Model: Creating Teachable Moments*. NSTA Press.

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Rosebery, A., & Warren, B. (Eds.). (2008). *Teaching science to English language learners: Building on students' strengths*: National Science Teachers Association.

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Wenham, M., & Ovens, P. (2010). *Understanding Primary Science*. Third Edition. Sage Publishing.

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Tentative Course Schedule
EDU308 SPRING 2017

Date	Topic	Readings	Assignments Due
Week 1			
1/10	Introduction – Asking Questions	• Read Syllabus - Come with questions	
1/12	Asking Questions and the Meaning of Inquiry	• Read Preface and Chapter 1 of *Bybee*	Bring your science notebook to class
Week 2			
1/17	The 5E Model of Scientific Inquiry	• Chapter 2 of *Bybee*	Book talk 1
1/19	Science Notebooks in the Classroom	• Chapter 1 of *Fulton & Campbell*	**Reading Response #1 Due** Book talk 2
Week 3			
1/24	Inquiry-based science	Guest Teachers: CINSAM	
1/26	Models of science teaching	• Chapter 2 of *Bybee*	Book talk 3
Week 4			
1/31	Science Standards	• Familiarize yourself with the NGSS website: *www.nextgenscience.org* • *PDF of Framework* on Blackboard	Book talk 4
2/2	FIELD TRIP - Makerspace	*No Reading Due*	**Reading Response #2 Due**
Week 5			
2/7	Planning for STEM Day	• *Gunckel* - PDF on Blackboard on the Experiences, Patterns, and Explanations model	Book talk 5
2/9	Digging in to the 5E Model	• Chapter 3 of *Bybee*	Book talk 6
Week 6			
2/14	CER Framework – Evidence Based Explanations	• Chapter 1 of *What's Your Evidence* (PDF)	Book talk 7
2/16	CER Framework – Evidence Based Explanations	• Chapter 2 of *What's Your Evidence* (PDF)	**Reading Response #3 Due** Book talk 8
Week 7			
2/21	Aligning plans to the NGSS	• Chapter 5 of *Bybee*	Book talk 9
2/23	Aligning plans to the NGSS		Book talk 10
Week 8			
2/28	TBD		Book talk 11
3/2	STEM Day Planning		**Midterm Exam Due on Blackboard by Midnight** Book talk 12
Week 9			

3/7 & 3/9	**No Class – NKU Spring Break**		
Week 10			
3/14	STEM Day In-Class Presentations		
3/16	STEM Day In-Class Presentations		
Week 11			
3/21	STEM Day Presentations		
3/23	STEM Day Presentations		
3/24	**STEM DAY!**		
Week 12			
3/28 & 3/30	**NO CLASS – Immersion Week**		
Week 12			
4/4	Modeling	• PDF from Blackboard on Modeling - *"Models and Modeling"*	Book talk 13
4/6	Modeling	• PDF from Blackboard on Modeling - *"Models and Modeling"*	**STEM Day Papers Due** Book talk 14
Week 13			
4/11	Evidence Based Explanations	• PDF of Reading on Blackboard	Book talk 15
4/13	Evidence Based Explanations	• PDF of Reading on Blackboard	
Week 14			
4/18	Classroom Discussions and Seeing Student Thinking	• PDF of Science Classroom Discussions on Blackboard	**Reading Response #4 Due**
4/20	Classroom Discussions and Seeing Student Thinking	• Same as Tuesday	
Week 15			
4/25	TBD		
4/27	TBD		
FINALS WEEK			
		Final Exams Due by Midnight Tuesday 5/3	