Course Syllabus

**Introduction**

How do teachers assist elementary children in exploring science and understanding science concepts?  What classroom conditions facilitate elementary children’s understanding in science?  What methods can teachers employ with elementary children to excite them about learning science?  These are just a few of the questions we will be addressing over the course of this semester.  You will explore these ideas through thinking about yourself as a science learner; by demonstrating reflective teaching practices; and through reading, writing and discussing ideas about elementary science teaching and learning.

**Course Rationale----**The purposes of this course include helping you to:

* clarify and refine your understanding of knowledge elements for teaching inquiry-based science (science concepts, scientific thinking [nature of science], and scientific practices/skills);
* become aware of elementary children’s ideas in science through various questioning, writing, and talking techniques and consider methods for developing more scientifically correct ideas;
* learn, practice and reflect upon various teaching strategies for elementary science;
* integrate concepts outlined in national and/or state standards into your lesson planning;
* explore, discuss and develop ways of assessing student learning in inquiry-based science;
* analyze and evaluate student learning and your own teaching to improve both areas;
* explore similarities and differences between science and engineering.

**Course Learning Objectives----**By the end of this course you should be able to:

* Demonstrate an understanding of the **three forms of knowledge** associated with learning about science and developing a scientific understanding in K-6. These include a) *content* knowledge (e.g., factual knowledge of theories, laws, etc. of the various disciplines of science), b) *scientific practices*associated with the process skills and habits of mind of doing science, and c) the *nature of science* (NOS) which explains how science as a discipline works and how knowledge is formed in science.
* Exhibit **appropriate questioning techniques** to uncover elementary students’ conceptual understanding of grade-level appropriate topics.
* Illustrate an understanding of **how elementary children think** about the scientific phenomenon by reflecting on what you observe or teach in the field.
* Describe the difference between formative and summative **assessment** and develop various forms of formative assessment to support your science teaching observation, as well as a scoring guide/rubric for assessing a long -erm inquiry project.
* Design a series of science lessons that incorporate a **learning cycle model** (e.g., 5E) and within these lessons select from a **variety of teaching strategies** to stimulate student interest and assess for students understanding of the science concepts (e.g., forming explanations [CER], productive talk moves, use of various writing prompts).
* **Reflect** upon your learning of how to teach science over the course of the semester referencing course readings and what you have observed first-hand in your field teaching. Identify **areas of strength and those you will seek to improve**with future professional development.
* **Design**a STEAM problem scenario illustrating the major components of STEAM education and articulating the rationale behind this instructional approach**.**

**Course Topics**

Through your experiences in the field, course readings, class discussions, and assignments the following topics will be examined to support your understanding of effective methods for teaching science.  In particular, the focus will be on developing a foundation of appropriate pedagogical content knowledge (PCK) needed to teach elementary science that you will continue to build on as you move to the classroom.  Instructional methods associated with developing your PCK will include:

* Using a learning cycle instructional approach to promote engagement, exploration, explanation/discussion, and application of science ideas with students.
* Formulating a variety of questions to serve different purposes (e.g., driving inquiry-based investigations, stimulating student thinking, probing at student reasoning, etc.)
* Understanding and implementing lessons that require students to gather, analyze and reason through data.
* Studying and experiencing various approaches for incorporating writing and talk to support students’ communication in science.
* Examining various ways of assessing elementary students’ science learning – both formative and summative methods to a) inform practice, b) differentiate instruction, and c) promote a sense of purpose for learning about science (i.e., motivate and challenge students).
* Considering applications of science to related disciplines, such as engineering and computer science.

**Course Policies**

Attendance/Participation

You are expected to attend every class. Your active participation is necessary both for your own learning and that of others. Therefore, students are expected to “attend” all classes, arrive on time, and be prepared to participate in respectful ways.  If it is necessary for you to be absent, please inform the instructor in advance regarding the reason for the absence. Together we will make a plan regarding the missed material.

Late Submission of Assignments

If you contact the instructor for an extension prior to the due date of the assignment please know that extensions are not automatic. Any extension will include a new, agreed‐upon submission date.

Disability Services

If you have a disability for which you are or may be requesting an accommodation, you are encouraged to contact both your instructor and the Office of Disability Resources and Services, 140 William Pitt Union, at 412-648-7890 or 412-383-7355 (TTY) as early as possible, but no later than the fourth week of the term or visit the Office of Disability Resources website as early as possible, but no later than the 4th week of the term. DRS will verify your disability and determine reasonable accommodations for this course.

Academic Integrity

Students in this course will be expected to comply with the University of Pittsburgh's Policy on Academic Integrity ([www.cfo.pitt.edu/policies/policy/02/02-03-02.htmlLinks to an external site.](http://www.cfo.pitt.edu/policies/policy/02/02-03-02.html)). Any student suspected of violating this obligation for any reason during the semester will be required to participate in the procedural process, initiated at the instructor level, as outline in the University Guidelines on Academic Integrity. This may include, but is not limited to, the confiscation of the examination of any individual suspected of violating University Policy. Furthermore, no student may bring any unauthorized materials to an exam, including dictionaries and programmable calculators.

Sexual Harassment

The University of Pittsburgh is committed to the maintenance of a community free from all forms of sexual harassment. Sexual harassment violates University policy as well as state, federal, and local laws. It is neither permitted nor condoned. It is also a violation of the University of Pittsburgh’s policy against sexual harassment for any employee or student at the University of Pittsburgh to attempt in any way to retaliate against a person who makes a claim of sexual harassment. Any individual who, after thorough investigation and an informal or formal hearing, is found to have violated the University’s policy against sexual harassment, will be subject to disciplinary action, including, but not limited to, reprimand, suspension, termination, or expulsion. Any disciplinary action taken will depend upon the severity of the offense. For more information, see the Web site: https://www.pitt.edu~provost/har.htmlLinks to an external site.

Diversity and Inclusion Statement

I consider this classroom to be a place where you will be treated with respect, and I welcome individuals of all ages, backgrounds, beliefs, ethnicities, genders, gender identities, gender expressions, national origins, religious affiliations, sexual orientations, ability – and other visible and nonvisible differences. All members of this class are expected to contribute to a respectful, welcoming and inclusive environment for every other member of the class.

Names and Pronouns

I will gladly honor your request to address you by your name and pronoun (that may differ from the school records). Please advise me of this preference early in the term so that I may make appropriate changes to my records. You may email me at [cquigley@pitt.edu](mailto:cquigley@pitt.edu) or tell me in person in class, whichever is most comfortable to you! I want to be sure you feel yourself and comfortable in our class community.

Copyright Statement

These materials may be protected by copyright. United States copyright law, 17 USC section 101, et seq., in addition to University policy and procedures, prohibit unauthorized duplication or retransmission of course materials. See Library of Congress Copyright Office and the University Copyright Policy.

Statement on Classroom Recording

To ensure the free and open discussion of ideas, students may not record classroom lectures, discussion and/or activities without the advance written permission of the instructor, and any such recording properly approved in advance can be used solely for the student’s own private use.

G-grades

If unforeseen events (such as major illness) prevent a student from timely completion of course work he/she may request a meeting with the instructor to discuss the possibility of earning a “G” grade for the term. If both student and instructor agree to the “G” grade, they collaboratively write a document that describes, in detail, what the student needs to do to complete the required course work and the time frame (not to exceed one academic year) within which he/she must do so. Upon receiving all work, the course instructor would evaluate the work and send forward to the Associate Dean a request for the permanent grade.

**Assignments/Grades**

*Participation:***worth 20% of your final course grade**

Due to the interactive nature of this course, regular attendance and high quality participation are expected.  **Being participatory in this class means:** a) being prepared for class discussion by completing all required readings, b) thinking critically and metacognitively about your responses to the readings when asked (in either oral or written format), c) actively participating in and reflecting on all class activities and group discussions), and d) respecting your classmates, yourself, and the instructor by helping to build a positive science learning community.

Course Summary:

| **Date** | **Details** | **Due** |
| --- | --- | --- |
| Fri Aug 21, 2020 | Assignment [Story of You!](https://canvas.pitt.edu/courses/52014/assignments/288817) | due by 11:59pm |
| Mon Aug 24, 2020 | Assignment ["Story of You" Discussion Post](https://canvas.pitt.edu/courses/52014/assignments/288850) | due by 11:59pm |
| Sun Aug 30, 2020 | Assignment [Discussion Forum: Distance education pedagogy](https://canvas.pitt.edu/courses/52014/assignments/305426) | due by 11:59pm |
| Mon Aug 31, 2020 | Assignment [PreK-2 or 3-5 Survey](https://canvas.pitt.edu/courses/52014/assignments/346494) | due by 11:59pm |
| Sun Sep 6, 2020 | Assignment [Discussion Forum: Course Review - Online 2nd Grade Course](https://canvas.pitt.edu/courses/52014/assignments/305425) | due by 11:59pm |
| Assignment [Discussion Forum: Course Review - Online 4th Grade Course](https://canvas.pitt.edu/courses/52014/assignments/305424) | due by 11:59pm |
| Tue Sep 8, 2020 | Page [Decide on Group for Inquiry Project](https://canvas.pitt.edu/courses/52014/pages/decide-on-group-for-inquiry-project) | to do: 11:59pm |
| Wed Sep 9, 2020 | Assignment [Lesson 1 Discussion: Understanding NGSS and Inquiry](https://canvas.pitt.edu/courses/52014/assignments/406570) | due by 11:59pm |
| Wed Sep 16, 2020 | Assignment [Lesson 1 Assignment: Long Term Inquiry Project with Technology Integration](https://canvas.pitt.edu/courses/52014/assignments/288851) | due by 11:59pm |
| Sun Sep 20, 2020 | Assignment [Lesson 1 Discussion: Understanding Computer Science Values](https://canvas.pitt.edu/courses/52014/assignments/288854) | due by 11:59pm |
| Wed Sep 23, 2020 | Assignment [Lesson 2 Assignment: Upload Videos blinking led, tri-color, and position servo and coding](https://canvas.pitt.edu/courses/52014/assignments/288855) | due by 11:59pm |
| Sun Sep 27, 2020 | Assignment [Lesson 2 Reflection: Experience with Hummingbird](https://canvas.pitt.edu/courses/52014/assignments/288856) | due by 11:59pm |
| Wed Sep 30, 2020 | Assignment [Lesson 3: Building Robots Where Poetry Comes to Life!](https://canvas.pitt.edu/courses/52014/assignments/288857) | due by 11:59pm |
| Sun Oct 4, 2020 | Assignment [Lesson 3 Reading and Reflection: Teacher's Experience with Poetry Comes to Life](https://canvas.pitt.edu/courses/52014/assignments/288858) | due by 11:59pm |
| Wed Oct 7, 2020 | Assignment [Lesson 3 Discussion: Merits of Robots in Elementary Classrooms](https://canvas.pitt.edu/courses/52014/assignments/288853) | due by 11:59pm |
| Sun Oct 11, 2020 | Assignment [Lesson 4: Create a Lesson that Integrates Robotics into another subject area](https://canvas.pitt.edu/courses/52014/assignments/288862) | due by 11:59pm |
| Wed Oct 14, 2020 | Assignment [Lesson 4: Peer Review of Hummingbird Lesson](https://canvas.pitt.edu/courses/52014/assignments/288860) | due by 11:59pm |
| Sun Oct 18, 2020 | Assignment [Lesson 5: Make a Student Artifact for the Lesson Plan you Designed](https://canvas.pitt.edu/courses/52014/assignments/288859) | due by 11:59pm |
| Wed Oct 21, 2020 | Assignment [Lesson 5 Self Assessment: Assessing the Student Artifact](https://canvas.pitt.edu/courses/52014/assignments/288861) | due by 11:59pm |
| Fri Oct 23, 2020 | Assignment [Permission to use your super cool work?](https://canvas.pitt.edu/courses/52014/assignments/457316) | due by 11:59pm |
| Sun Oct 25, 2020 | Assignment [Lesson Discussion: What is Data Science?](https://canvas.pitt.edu/courses/52014/assignments/288906) | due by 11:59pm |
| Wed Oct 28, 2020 | Assignment [Lesson Assignment: Dear Data Selfie](https://canvas.pitt.edu/courses/52014/assignments/288907) | due by 11:59pm |
| Mon Nov 2, 2020 | Assignment [Lesson Discussion: Data Selfie Analysis](https://canvas.pitt.edu/courses/52014/assignments/288910) | due by 11:59pm |
| Wed Nov 4, 2020 | Assignment [Lesson Assignment: Dear Data Mini-Project](https://canvas.pitt.edu/courses/52014/assignments/288953) | due by 11:59pm |
| Sun Nov 8, 2020 | Assignment [Lesson Discussion: Data Visualization](https://canvas.pitt.edu/courses/52014/assignments/288958) | due by 11:59pm |
| Wed Nov 11, 2020 | Assignment [Lesson Assignment: Dear Data Mini-Project Visualization](https://canvas.pitt.edu/courses/52014/assignments/288959) | due by 11:59pm |
| Sun Nov 15, 2020 | Assignment [Lesson Assignment: Data Science Integration](https://canvas.pitt.edu/courses/52014/assignments/288962) | due by 11:59pm |
| Wed Nov 18, 2020 | Assignment [Lesson 1: STEAM in Elementary Classrooms](https://canvas.pitt.edu/courses/52014/assignments/349287) | due by 11:59pm |
| Fri Nov 20, 2020 | Assignment [Lesson 3 Assignment: Identifying Parts of STEAM](https://canvas.pitt.edu/courses/52014/assignments/288892) | due by 11:59pm |
| Wed Dec 2, 2020 | Assignment [Lesson 4 Assignment: Creating a STEAM Problem Scenario](https://canvas.pitt.edu/courses/52014/assignments/288898) | due by 11:59pm |
|  | Assignment [OMET Survey](https://canvas.pitt.edu/courses/52014/assignments/465658) |  |
| Assignment [Optional! Upload your Robot and Poetry here](https://canvas.pitt.edu/courses/52014/assignments/443861) |  |

**Prev monthNext monthMay 2021**

| Calendar | | | | | | |
| --- | --- | --- | --- | --- | --- | --- |
| **Sunday** | **Monday** | **Tuesday** | **Wednesday** | **Thursday** | **Friday** | **Saturday** |
| 25 April 202125Previous month | 26 April 202126Previous month | 27 April 202127Previous month | 28 April 202128Previous month | 29 April 202129Previous month | 30 April 202130Previous month | 1 May 20211 |
| 2 May 20212 | 3 May 20213Today | 4 May 20214 | 5 May 20215 | 6 May 20216 | 7 May 20217 | 8 May 20218 |
| 9 May 20219 | 10 May 202110 | 11 May 202111 | 12 May 202112 | 13 May 202113 | 14 May 202114 | 15 May 202115 |
| 16 May 202116 | 17 May 202117 | 18 May 202118 | 19 May 202119 | 20 May 202120 | 21 May 202121 | 22 May 202122 |
| 23 May 202123 | 24 May 202124 | 25 May 202125 | 26 May 202126 | 27 May 202127 | 28 May 202128 | 29 May 202129 |
| 30 May 202130 | 31 May 202131 | 1 June 20211Next month | 2 June 20212Next month | 3 June 20213Next month | 4 June 20214Next month | 5 June 20215Next month |

**Assignments are weighted by group:**

| **Group** | **Weight** |
| --- | --- |
| **Assignments** | 70% |
| **Discussions** | 30% |
| **Total** | **100%** |