**CTEE 7430/7436: CURRICULUM & TEACHING IN NATURAL SCIENCE**

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|  | **Instructor:** Dr. Charles J. Eick**Office:** Haley 5058**Office Hours:** By appointment**Phone:** 334-844-6887 **E-mail:** eickcha@auburn.edu **Class Time:** Thursdays 4:00-6:50 p.m.**Location: FA12 - All Distance Delivery****Credit Hours**: 3 semester hours  |  |

**Required Text:**

Krajcik, J. & Czerniak, C. (2007). *Teaching science in elementary and middle school: A project-*

*based approach*. New York: Lawrence Erlbaum Associates **[J&M Bookstore]**

**Required Materials:**

*Macromania: An adventure in the study of stream macroinvertebrates* ([www.acornnaturalists.com](http://www.acornnaturalists.com))

{FREE from Dr. Eick if you pick it up from Haley 5058}

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**Required Equipment:**

Computer (updated software), high-speed Internet access, and **headset with microphone** (USB connection and noise cancelling) ($25-35) for access to Canvas Conferencing

Access to a digital video-camera (also in LRC for check-out) for taping an inquiry demonstration

**Canvas Tutorials:**

See the video guides for how to use the Canvas tools: <http://guides.instructure.com/m/4210>

**Course Communication:**

Choose Canvas **Profile** (top right) then **Notifications** (left menu) to alert your university email, mobile phone, and/or Facebook page when new instructor messages are posted and other alerts.

**NSTA Regional Conference:**

Atlanta, November 1-3, *Science: Passport for Success*

**Text References (LRC Reserve):**

Friedl, A. & Koontz, T. (2005). *Teaching science to children: An inquiry approach*. New York:

 McGraw-Hill. {Example inquiry demonstrations for all science concepts}

**Electronic References:**

Annenberg Learner: [www.learner.org](http://www.learner.org) (select <<Science-ALL>>)

National Research Council (2005). *How students learn: Science in the classroom*.

<http://www.nap.edu/catalog.php?record_id=11102>

National Research Council (2012). *A framework for K-12 science education: Practices, crosscutting concepts, and core ideas.* <http://www.nap.edu/catalog.php?record_id=13165>

Next Generation Science Standards: <http://www.nextgenscience.org/>

{NOTE: The second draft of the new national science standards will be released for comment this semester sometime. We will rely on the *Frameworks* for our work this semester.}

Alabama Water Watch Program: <http://www.aces.edu/dept/fisheries/aww/aww/index.php>

Save Our Saugahatchee, Inc.: <http://sites.google.com/site/saveoursaugahatchee/>

**Course Description:**

This course will apply current research and national standards on ‘best practices’ in science education to project-based design of science curriculum. Course experiences will build students’ understanding and ability to do Project Based Science (PBS) through lessons that support construction of the final project-based unit plan. Students will experience components of a model project-based science unit – *Living Streams* – and how it ties to science literacy on water sustainability issues. Students will create a project-based science unit that can be used in the classroom.

**Course Objectives:**

Upon completion of this course, students will be able to:

1. Identify and embrace important national goals of science education and science literacy in the K-8 classroom, including applications of science and technology to societal issues and problems.
2. Articulate a rationale for teaching science through social constructivism and brain-based research on how students learn.
3. Describe and define a project-based approach (PBA) to teaching science, including key components, and how it is different from other integrated and thematic approaches.
4. Meaningfully demonstrate the inquiry process including planning scientific investigations, interpreting data, and supporting student collaboration in PBS units.
5. Apply best practices that support project-based approaches in delivery strategies, management, and assessment of students in PBS units.
6. Create a project-based science unit plan for use in the classroom that incorporates PBA tenets.

**Course Assignments and Evaluation:**

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| Required Assignments (450 POINTS):Chapter Exercises – 160 points (8 @ 20 points each)Project Blog – 50 points (5 @ 10 points each)Rationale for Science Teaching Paper – 40 pointsProject-Based Science Unit Plan – 160 points (Three-part submission)\*Powerpoint Presentation of Projects – 40 points\*NOTE: The powerpoint presentation listed on the last class day will be the final course exam. | Grading Scale:405-450 points = A360-404 points = B315-359 points = C270-314 points = D 269-0 points = F |

**Weekly Assignments and Deadlines**

The class will be formed into ***learning communities*** – groups of 3-4 students – for the purpose of peer discussion and completing the group portion of the chapter exercises. Group members will schedule a conference on chapter exercises at a day and time convenient for all members but before the submission deadline.

Please let the instructor know your preference for learning community group members ASAP.

**Chapter Exercises:** The chapter assignment is an individual and group completed assignment. Students must use their text and each other in their group to complete the assigned exercises. Students write (or draw) their responses in the word document given. Scanning of work into pdf format may be needed. Points per response are designated. These exercises prepare students to create their Project-Based Science Units.

Members must first complete the individual exercises BEFORE their scheduled ***Canvas Conference*** group meeting. The instructor will set up Canvas Conference groups. Through the group meeting, students will discuss and complete the final ‘group’ exercises with required group input.

Word or pdf documents must be uploaded under the Assignments tab of Canvas and under the appropriate chapter exercise. These assignments must be completed and uploaded by Thursday before Midnight CST the week AFTER the scheduled topic/date in the syllabus.

**NOTE:** A group member must have attended the Canvas Conference meeting online and contributed in the discussion in order to get credit for the group exercises portion of these assignments.

**Project Blog:** This assignment is found under the Discussion tab on Canvas. It is a public blog for the class and instructor to view. Students must respond to the blog questions/issues posted by the instructor about their thinking on the developing project. All blog postings must end with requested assistance or help for ideas to further project thinking and success. After blogs are posted by the given deadline, students must come back to comment to the blogs where they can help. The instructor will also participate in helpful commenting. Students are encouraged to later check their postings for the useful comments and suggestions given.

Blog ‘Ground Rules’ for Full Points:

1. Post a blog that is a minimum of 100 words and a maximum of 175 words. Respond to the question thoroughly first, before seeking further advice.
2. **Post by the** **Monday midnight CST deadline** the week after the topic is assigned. Do NOT comment to the postings until AFTER this deadline so that everyone has an equal opportunity at receiving comments and assistance!
3. Comment to at least 3 postings where you can most give advice. Comments should be helpful and not simply affirm the posting. Comment to people outside your learning community also!
4. **Comment BEFORE the Thursday midnight CST deadline** the week after the topic is assigned.

**NOTE:** Students must meet all of the blog ground rules and deadlines in order to get full credit for this assignment, including commenting to fellow students’ blogs.

**Major Assignments and Deadlines**

The **Rationale for Science Teaching Paper** (SEE ATTACHED) will incorporate newly learned information about how students learn science best, what you consider is most important in this process, and how you do/will enact this best practice in your classroom. Submission of this paper will be under the ASSIGNMENTS menu on Canvas.

The **PBS Unit** (SEE ATTACHED) will be graded in three parts at three different times in the term. Comments and notes made on the first parts should be used to make changes to the final project due at end-term. Sample completed projects will be placed on Canvas. Submission of the PBS assignment will be under the ASSIGNMENTS menu on Canvas.

The **Voice-Over Powerpoint Presentation** (SEE ATTACHED) will present the key components of the created PBS unit. Students will also be required to provide ‘friendly’ peer review comments for the presentations that they will be assigned to view on Canvas. Students must complete the viewing and commenting portion of this assignment in order to have their presentation grades posted. Submission of the PPT presentation will be under the ASSIGNMENTS menu on Canvas.

Major assignments are due by Thursday before Midnight CST of the week that they are due – See syllabus schedule.

**Course Content and Schedule:**

**Frequently check the Canvas Announcements for course news, assignment information, and updates, including changes to this schedule.**

Week 1 8/16 Teaching Science to Children – Chapter 1

* **Chapter 1 exercises**

Week 2 8/23 How Students Construct Understanding of Science – Chapter 2

* **Chapter 2 exercises**

Week 3 8/30 Establishing Relevance to Students’ Lives – Chapter 3

* **Chapter 3 exercises**
* **Rationale for Science Teaching Paper due next week**

 Week 4 9/6 Establishing Relevance to Students’ Lives – Chapter 3

* **Discussion #1**

Week 5 9/13 Developing Scientific Investigations – Chapter 4

 *Living Streams Project* – **Virtual Stream Walk**

* **Chapter 4 exercises**

Week 6 9/20 Developing Scientific Investigations – Chapter 4

* **Discussion #2**

Week 7 9/27 Making Sense of Data and Sharing Findings – Chapter 5

 Using Learning Technologies to Support Students in Inquiry – Chapter 6

 *Living Streams Project* – Macromania game

* **Chapter 5/6 exercises**
* **PBS Unit – Numbers 1-3 due next week**

Week 8 10/4 Making Sense of Data and Sharing Findings – Chapter 5

Using Learning Technologies to Support Students in Inquiry – Chapter 6

*Living Streams Project* – Alabama Water Watch – **Virtual Stream Field Trip**

* **Discussion #3**

Week 9 10/11 Collaboration in the Science Classroom – Chapter 7

* **Chapter 7 exercises**

Week 10 10/18 Collaboration in the Science Classroom – Chapter 7

* **Discussion #4**

Week 11 10/25 Instructional Strategies that Support Inquiry – Chapter 8

*Living Streams Project* – Direct-indirect & Experiential strategies

* **Chapter 8 exercises**
* **Instructor Conferences on PBS Units via Canvas – See schedule**

National Science Teachers Association (NSTA) Regional Conference on Science Education

Atlanta, GA – November 1-3

 Week 12 11/1 Instructional Strategies that Support Inquiry – Chapter 8

* **Discussion #5**
* **PBL Unit – Number 4 (and 1-3 revision) due next week**

 Week 13 11/8 Assessing Students and Understanding in Science – Chapters 9/10

* **Chapter 9/10 exercises**

 Week 14 11/15 Assessing Students and Understanding in Science – Chapters 9/10

* **PBL Unit – Numbers 5-8 (and 1-4 revision) due November 29th**

Thanksgiving Break – Suggested Reading for New Teachers:

 **Managing the Science Classroom – Chapter 11**

Week 15 11/29 Complete PBL Voice-Over Power-point Presentation

* **PBL Unit Presentation due December 3rd**
* **Peer Review Comments due December 5th**

**Class Policy Statements**:

Standard English: All written assignments must be typed and should adhere to Standard English usage and conventions. Assignments with excessive grammatical errors or typos must be redone at point loss. Writing should follow APA Sixth Edition conventions.

Late Work Submissions: Weekly assignments (chapter exercises and blogs) must be presented or posted on time for credit. Other major assignments if submitted late without excuse will lose a letter grade for each day late up to three days. Points earned for each assignment will be posted under the Grades menu on Canvas.

Participation: Students are expected to participate in all class assignments and group discussions. It is the student’s responsibility to contact the instructor if assignment deadlines are not met or a group discussion is missed. Students are responsible for initiating arrangements for missed work. Late work will be accepted without penalty only for university-approved excuses as outlined in the *Tiger Cub*. Excused late work must be submitted directly to the instructor via email no later than 7 days after the original due date or it will not be accepted.

**Students must have the appropriate and working computer hardware, software, and Internet connection for this course. This is the student’s responsibility. Failure of students’ equipment (not University Canvas) is NOT an excuse for on-line absences and late assignments.**

 Attendance/Absences: Attendance at scheduled instructor and group online synchronous meetings is required, as detailed already in the syllabus schedule. Excuse notes for absences (with proper letterhead and signature) must be scanned (pdf) and email attached to the instructor no more than seven days after the absence, or it is unexcused. **Three unexcused absences from scheduled online meetings will mean a failing course grade**.

Unannounced quizzes: There will be no unannounced quizzes.

 Accommodations: Students who need accommodations are asked to arrange a meeting during office hours the first week of classes, or as soon as possible if accommodations are needed immediately. If you have a conflict with my office hours, an alternative time can be arranged. To set up this meeting, please contact me by e-mail. Bring a copy of your Accommodation Memo and an Instructor Verification Form to the meeting. If you do not have an Accommodation Memo but need accommodations, make an appointment with the Program for Students with Disabilities at 1244 Haley Center, 844-2096 (V/TT).

 Honesty Code: The University Academic Honesty Code and the Tiger Cub Rules and Regulations pertaining to Cheating will apply to this class.

 Professionalism: As faculty, staff, and students interact in professional settings, they are expected to demonstrate professional behaviors as defined in the College’s conceptual framework. These professional commitments or dispositions are listed below:

* Engage in responsible and ethical professional practices
* Contribute to collaborative learning communities
* Demonstrate a commitment to diversity
* Model and nurture intellectual vitality

**RATIONAL FOR SCIENCE TEACHING PAPER – *40 points***

Why a rationale paper?

Writing a rationale paper for your chosen practice in the science classroom supports your development as a teacher because you have to ponder and articulate your current thoughts about teaching, learning, and goals in your practice. A “rationale” is different from a “philosophy” because it merges *who you are* (including personal experience, beliefs, and values) with *what you are learning* about effective science teaching (including National Standards, scientific literacy, inquiry, constructivism, learning cycle, brain-based research, reading-writing to learn, etc.). Thus, a rationale paper of “you” is supported by elements of effective teaching that you have learned and are learning in your program. It should cite specific readings or resources from this course, and related past ones, that most inform your practice. Being able to articulate your rationale for science teaching to other peers, teacher colleagues, and administrators shows that you know who you are as a teacher and have a definite plan for your future classroom and students. *Your final paper should be free of spelling and grammatical errors.* Your rationale should make sense with what you believe about science teaching linked to what we know about best practice and what you want to do in your science classroom with children.

NOTE: Job interviewers who care about the quality of teachers hired in their systems often ask candidates about their teaching approach, philosophy, typical week, or rationale for teaching.

What’s in a rationale paper?

A rationale for science teaching paper is made up of five (5) parts where you describe your thoughts on:

1. (10 points) How learning takes place, consistent with learning theory and research. Refer to specific information from the course text and NRC 2005 text (Krajcik & Czerniak, 2007; National Research Council (NRC), 2005).
2. (10 points) What science teaching is, consistent with how learning takes place – tied to methods, models of teaching, and National Standards (e.g., Krajcik & Czerniak, 2007; NRC, 2005, 2012).
3. (10 points) Goals for students. Why are you doing what you are doing? What will students learn from your efforts? What goals are most important to you? – tied to scientific literacy, National Standards, and equity and opportunity for all students (e.g., Krajcik & Czerniak, 2007; NRC, 2005, 2012).
4. (10 points) How you enact your rationale in practice, with descriptive examples of what you actually do (or plan to do) in your science classroom to demonstrate your rationale.
5. (Required) References (3 minimum) – a reference or bibliography section in APA format, must be connected to the citations in your paper (i.e., no stand-alone references). Three references should be used from the course texts listed above, with other readings adding to this list.

**See Purdue OWL for APA Formatting:** [**http://owl.english.purdue.edu/owl/resource/560/01/**](http://owl.english.purdue.edu/owl/resource/560/01/)

What format should I follow in presenting the five (5) parts in my paper?

* Write between 3 and 5 pages double-spaced, one-inch margins, NOT counting reference page.
* Write for a non-science education audience (e.g. principal) so avoid too technical a discussion, using technical terms sparingly and describing/defining them when used.
* Write in a narrative, first person form.
* Write reflectively and personally as you address each point, using specific examples from your readings (cite) and from the classroom (i.e., actual teaching and lessons).
* Write with no spelling or grammatical errors (Peer Check It: Does it read right and make sense?)

**Holistic Rubric:** 10 points = Excellent; 9-8 points = Good; 7-6 points = Fair; 5 points = Poor; 4-0 points = Incomplete

**NOTE:** Points will be deducted for incorrect citation and reference format. Papers with multiple spelling or grammatical errors can earn no more than a ‘C’ grade after rewrite.

Adapted from Tom Rocklin (2000) website: <http://www.uiowa.edu/~c07p385/philosophy.shtml>

**Project-Based Science Unit Requirements (160 points) – Follow chapter 12 of text**

Directions: Develop each given area below for your project-based science unit and grade. Submit your project online clearly delineating the seven sections ‘tabbed’. A project-based unit can be short or long, but for our course should be one to two weeks of 45-minute periods. Consider the use of *GEMS Guides* and other investigative curricula in your unit. You MUST use multiple sources for lessons or materials in your unit – to make it ‘your’ work. Use the national ***Frameworks*** (NRC, 2012) electronic resource for the **K-5 science and engineering practices, crosscutting concepts, and core ideas**.

1. Cover sheet (required) – Name, date, grade level, project driving question, duration of unit, related sketch/image
2. Student learning performances (objectives) **(24 points)**
	* Consult the ***Frameworks*** for the list of science and engineering practices, crosscutting concepts, and core and component ideas (physical science, life sciences, earth/space sciences) that apply to your chosen topic.
	* Develop learning performances or objectives in each of the four knowledge domains, considering higher levels of cognitive functioning, from your applicable frameworks.
	* Create a table similar to Table 12.1 on page 435 for your generated learning performances and place your chosen national frameworks before it.
3. Driving question **(16 points)**
	* Suggestion: See Learning Activity 12.2 on page 452.
	* Write out your driving question and your rationale for selecting it.
4. Lesson plans including[[1]](#footnote-1): **(48 points)**
	* student learning performances (or learning objectives) – applicable ones from #2 table above.
	* **relationship of lesson to the driving question** (How does its sub-question help answer it?)
	* materials (and any special needed print material for lesson parts or assignments)
	* instructional strategies[[2]](#footnote-2)
	* time required
	* cautions
	* instructional sequence – introduction, representing the content, establishing links to the driving question
	* assessment – description of the assessment embedded in the lesson for evaluating student learning
	* lesson source – specific URL, text, guide, etc.
5. Assessments **(32 points)**
* Create varied and embedded assessments that are appropriate for measuring student learning performances (objectives); Assessments in a separate section must be complete and with scoring rubrics, check-lists, etc.
* Revisit your learning performance table and add the assessment performance that matches it (See Table 9.1)
1. Calendar of activities **(16 points)**
* See Table 12.5 example on page 458 before creating your own calendar of activities. Entitle each day with your **sub-question** (or inquiry question) that the lesson addresses. Also, list your **embedded assessment**.
1. Resources **(16 points)**
* Select and evaluate (See Table 12.6 and 12.7) major resources not readily available to all teachers
* Create a resource list with contact-purchase information (e.g., community contacts, GEMS guide, FOSS kit)
1. Integration of curriculum **(8 points)** [NOTE: This is NOT a separate section of your unit plan]
* Review your unit for other national inter-disciplinary standards that you meet (e.g., math, social studies, language arts, etc.): See other national standards for your grade level or grade band.
* Add these standards under their appropriate discipline heading (math, etc.) to #2 above.

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Project-Based Learning Unit Scoring ‘Analytical’ Rubric (160 points)**

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| RUBRIC 8.0 points = completely meets requirement 6.0 points = mostly meets requirement4.0 point = sometimes meets requirement2.0 point = rarely meets requirement0.0 point = does not meet requirement | NOTE KEY LESSON REQUIREMENTS+Multiple sources (more than one) for lesson plans are required.+At least one detailed Scientific Investigation as defined in this  course is required.+At least one community resource is required.+Children’s literature is required.+Use of technology across lessons is required. |

1. Cover sheet complete: \_\_\_\_\_\_\_ **(required check)**
2. Student learning performances **(24/\*8 points)**
3. All new national science Frameworks (from three areas) that apply are listed: \_\_\_\_\_
4. \*All non-science national standards (e.g., math, language arts, etc.) that apply are listed: \_\_\_\_\_
5. Learning performances in a table in all knowledge *domains* and *dimensions*: \_\_\_\_\_
6. Learning performances are congruent with listed Frameworks and standards: \_\_\_\_\_
7. Driving question **(16 points)**
	1. The driving question meets the 6 criteria for a good question: \_\_\_\_\_
	2. Learning performances directly address the Driving Question: \_\_\_\_\_
8. Lesson plans section **(48 points)**
	1. Opening and closing activities address the Driving Question: \_\_\_\_\_ **(required check)**
	2. Lesson-to-lesson sequence (multiple sources) is coherent & conceptually strong: \_\_\_\_
	3. Lesson content and process matches student learning performances: \_\_\_\_\_
	4. Lesson sub-questions or outcomes help answer the driving question: \_\_\_\_\_
	5. Scientific Investigation *(clearly identified)* includes all appropriate sections: \_\_\_\_\_
	6. *Instructional sequence* of lessons are ‘teacher-ready’ to follow and use: \_\_\_\_\_
	7. Each lesson includes all completed 9 sections outlined in the assignment: \_\_\_\_\_
9. Assessments section **(32 points)**
	1. Assessments are *authentic*, meaningful, multiple, and varied: \_\_\_\_\_
	2. Assessments are *embedded* in instruction: \_\_\_\_\_
	3. Assessments are congruent with learning performances (and listed in Table): \_\_\_\_\_
	4. Assessments have rubrics/checklists for scoring, where appropriate: \_\_\_\_\_
10. Calendar of Activities **(16 points)**
	1. Calendar lists each day of unit instruction & activity description in table format: \_\_\_\_\_
	2. Calendar days list sub-question as header and embedded assessment piece: \_\_\_\_\_
11. Resources **(16 points)**
	1. All major resources that are not readily available to the teacher are listed: \_\_\_\_\_
	2. Resources include contact, location, source, and/or purchasing information: \_\_\_\_\_
12. (Integrated into #2b above).

TOTAL SCORE: \_\_\_\_\_\_\_\_ (out of 160 points)

**Power-Point Presentation** **(40 points)**

Your presentation of your Project Based Science Unit to your peers and instructor must be recorded over powerpoint slides and include the following slides:

* **Introductory Slide** – Driving question as title, grade level, school (if teaching), your name, course (CTEE 7436: Science); narration addressing why you chose this question
* **Unit Overview Slide** – Key features of your PBL unit
* **Content Standards Slide(s)** – Frameworks met for science and standards for other disciplines
* **Lesson Overview Slide(s)** – \*Lesson titles; along with brief narrations on the nature and context of each lesson and how it addresses the driving question and student learning; particularly feature your scientific inquiry lesson(s); images encouraged
* **Community Resources Slide** – Names, affiliations, addresses, contact information; along with narration describing each resource and their contribution to your PBL unit
* **Lesson Planning Sources Slide** – Title, publisher, Internet addresses of all major sources used for obtaining lessons for your PBL unit
* **Sample Authentic Assessment Slide** – Actual example of key authentic assessment used in your PBL unit (e.g., Detailed rubric, check-sheet, etc.); along with narration describing the assessment situation, purpose, and how it addresses science frameworks and inter-disciplinary standards

\*These slides will use the most time in your slideshow and narration

**Word Requirement** – Slides should NEVER have complete sentences and paragraphs on them. You provide details through your audio narration of each slide and its listed ‘talking’ points.

**Time Requirement** – Your voice-over powerpoint as a played movie should be 8-12 minutes. Points will be deducted for slideshows that go over 12 minutes of time.

**Images Requirement** – You should judiciously use images/photos on slides where appropriate and where it enhances interest and understanding of your work, lessons, and resources used – Please refrain from ‘cute’ images as fillers

**CAUTION:** Play back your recording to see that it works and meets time limitation requirements. It should play through from start to finish automatically.

Powerpoint Descriptive ‘Holistic’ Rubric:

36-40 points: All 7 slide categories are met; Information is very complete in each category; Slides are very easy to read and well organized (NO sentences/paragraphs); Narration is clear and audible; Images and graphics add to understanding

32-35 points: All 7 slide categories are met; Information is complete in each category; Slides are easy to read and well organized (NO s/p); Narration is mostly clear & audible; Images/graphics mostly add to understanding

28-31 points: All 7 slide categories are met; Information is mostly complete in each category; Slides are somewhat easy to read and organized (NO s/p); Narration is mostly clear and audible; Images/graphics somewhat add to understanding

24-27 points: All 7 slide categories are met; Information is incomplete in each category; Slides are somewhat easy to read and organized (NO s/p); Narration is somewhat clear and audible; Images and graphics somewhat add to understanding

Less than 24 points: All 7 slide categories are not met; Information is incomplete in each category; Slides are not easy to read and organized (NO s/p); Narration is not clear and audible; Images and graphics detract from understanding

1. Most curricula will include activities written like lesson plans that address most of these bullets. Attach a copy of the activity itself and only add the missing bullets of information. Also, attach any needed print materials for lesson parts or assignments. **Note: You must have an opening and culminating activity that address your Driving Question.** [↑](#footnote-ref-1)
2. Consider varied instructional strategies from each category: Direct, indirect, experiential, independent. You MUST include at least one scientific investigation (inquiry question, data gathering, data analysis, conclusion, and sharing), a community resource, children’s literature, and use of technology – ALL OF THESE ITEMS ARE REQUIRED. [↑](#footnote-ref-2)