

EDUC 267C | Winter 2021 | Class Syllabus
Curriculum & Instruction in Science

Course Information	
<p>Curriculum & Instruction in Science Tuesdays 3:15pm - 6:15pm</p> <p>Class Location: CERAS 300 Course Materials Available on Canvas</p>	
Instructor Information	
<p>Daniel Pimentel (he/him) <i>PhD Candidate in Science Education & Learning Sciences</i> dpimente@stanford.edu Office Hours: by appointment</p>	<p>Monica Sircar (she/her) <i>PhD Student in Science Education</i> monigeek@stanford.edu Office Hours: by appointment</p>

Course Description

Over the summer, you learned that you don't just teach science, you teach *your students* science. Effective science teachers know their content *and* they know how to integrate that knowledge with insights about their context and their students. In the fall, we built on these ideas by designing goal-driven lesson plans that actively engaged students with constructing science explanations. Together, those two quarters helped you to establish a solid foundation for effectively teaching science to your students.

This winter, we will extend these themes, working from four main perspectives:

- 1. Your Context:** What are the specific issues relevant to *your* teaching context that shape *your* teaching and help *your* students in *your* school make progress and achieve in science?
- 2. The Big Questions of Science Education:** "Why science education?" We'll discuss how this question relates to your classroom but we'll also challenge you to consider national – and international – arguments about why we teach science and what it should look like in secondary classrooms.
- 3. Science as a Story:** Whether you recognize it or not, your lessons and units tell a story. In the design of your course, what story are you telling about science?
- 4. Sensemaking with Science Ideas & Practices:** Science is a human endeavor. How do we engage students in scientific sensemaking? We'll discuss how to integrate the Science and Engineering Practices into your lessons.

Course Objectives

We will have several course objectives this quarter.

By the end of this course, you will be able to...	You will demonstrate your progress toward this objective by...
1. Plan a detailed and coherent unit plan that supports students with making sense of an anchoring phenomenon.	Incrementally designing components of your unit plan, including assessments, and revising them based on feedback throughout the course
2. Plan and use both formative and summative assessments to improve curriculum, instruction, and assessment.	
3. Engage your students in lessons that emphasize the NGSS practices.	Selecting, discussing, and reflecting on artifacts of your teaching practice that incorporate the science & engineering practices
4. Reflect meaningfully on your planning, instruction, and assessment to realize your vision of science education with your students.	Outlining your vision for science education and revising this vision based on insights from what you learn this quarter.
5. Explain how ideas from science education research inform effective instructional and assessment practices.	Reading, summarizing, and reflecting on science education research articles and how they relate to your practice.

Our Course Sessions

In order to achieve the course outcomes, our sessions will highlight a particular aspect of science teaching, with a specific emphasis on unit planning. Collectively, we will explore the theory underlying and supporting this aspect and discuss strategies you can use in your placements and in your own classroom. Over the course of the quarter, you will develop a unit plan that follows the principles of Understanding by Design (Wiggins and McTighe, 2005) and supports students in using the science and engineering practices to make sense of an anchoring phenomenon.

As part of this process, we will explore the Scientific and Engineering Practices.

These practices are:

1. Asking questions and defining problems
2. Developing and using models
3. Planning and carrying out investigations
4. Analyzing and interpreting data

5. Using mathematics and computational thinking
6. Constructing explanations and designing solutions
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information

In addition to unpacking the practices, discussing what they might look like in your classroom, our science time will be used to model an example of both how lessons might flow together and how a specific NGSS practice could be modified.

Finally, we believe that you become a better teacher by becoming a reflective practitioner (see Schön, 1987). Reflective practice is enhanced by sharing your challenges with others, reflecting on them, and learning from your mistakes. Not only will you be able to share your work, but collectively, we will also reflect on the shared example during science time.

With these aims in mind, most sessions will follow the same basic routine:

- Discuss a specific element of unit planning;
- Explore one of the NGSS practices, including reflecting on a shared example, as well as your own efforts towards implementing the NGSS practices;
- Examine a strategy that might better support the implementation of the NGSS practices;
- Design parts of your own NGSS-aligned unit plan; and
- Compare and contrast your vision of science education with research on science teaching and learning.

Land Acknowledgement

We acknowledge that Stanford University sits on the unceded land of the Muwekma Ohlone people. We acknowledge the painful history of genocide and forced removal from this territory, and we honor and respect the many diverse Indigenous peoples still connected to the land on which we gather. We remember their continued connection to this region and we offer our respect to their Elders and to all Ohlone people of the past and present.

Preferred Name & Pronouns

Class rosters are provided to the instructors with students' legal names and gender designations; these records might not correspond to the name and gender pronouns that you use. We will gladly address you by your preferred name and pronouns. Please also let us know if these change at any point.

Expectations

What do we expect of you?

Our goal is for this course to be a collegial space where we can all learn from and with each other. To that end, we expect that you will be present in class and that you will come prepared to engage in discussions with curiosity, actively challenge your own understandings, be willing to work through ambiguity, and be respectful of the diversity of experiences and identities expressed by your colleagues. Specifically, we have three expectations that we would like to highlight:

- *Participation:* Our collective engagement in class is essential for your learning and the learning of others. While participation will look and sound different for each of you, we expect for everyone to monitor their airtime, stepping back to create space for others or speaking up to share your ideas.
- *Communication:* We live in an unpredictable world; things happen. Please communicate with us via email if you need to be late or absent *before* the session if possible. We ask that you please schedule office hours with one of us if you miss a class to catch up on what you missed.
- *Digital Tools:* We live in a digital world. We'll use digital tools in class to support our learning. When these tools are not central to our learning, we ask that you set them aside, including your personal devices. Please check them during breaks. In cases of emergency, please step outside to use your device.

What can you expect of us?

You can expect that we will work to get to know you as a student and, more importantly, as a human. We will strive to create a collaborative and equitable learning environment where each of you feels comfortable sharing what you've learned, challenging other's ideas, and wrestling through your own uncertainties. We will work to build trust with you and amongst our community of learners. We will provide you with feedback and we will do our best to be available to meet with you when you need it. You can expect we will do a lot of hands-on activities, reflections, and moving around. We will do our best to be organized, but we are also dedicated to being responsive to your needs. As a result, we may make adjustments to this syllabus in response to what we learn about you all and what you need as students.

Grading & Feedback

Our philosophy as instructors is to prioritize feedback over assigning you with grades. We know that you are here to gain as much understanding and skill as you can and that you will all learn at different rates. You are all graduate students taking our class to learn, engage, and grow with the content. Our job as instructors, and your job as students, is to provide continuous feedback to support engagement with our course. If you are adhering to the above expectations and making sincere efforts to fully participate in assigned tasks during and outside of class, you can expect an A.

We will provide you with feedback and assign your final grade based on the assignments detailed below.

Assignment Overview

All assignments should be submitted through Canvas. When it makes sense for the assignment, we will do our best to build in time for you to share and discuss your work with one another during class. Therefore, assignments should be ready to share during class on the day that they are due unless indicated below.

#	Name	Description	Eval.	%	Due
1	Readings & Reading Summary	<p>This assignment aligns with course objective #5.</p> <p>Readings: Each week there will be assigned reading(s). Please come to class prepared to discuss these readings.</p> <p>Summary: For two of the week's readings, your pair will be responsible for summarizing the big ideas of the article(s). Additionally, you will be asked to identify: 1) an idea from the paper that resonates with your teaching experiences so far; and 2) a lingering question. Each summary will be added to a shared class document.</p>	Credit / No Credit	10%	Ongoing
2	Vision of Science Education	<p>This assignment aligns with course objective #4.</p> <p>Part A: You will be asked to write 250-500 words responding to specific prompts and create a sketch or visual sharing your vision of an effective science classroom. This is your philosophy of science teaching, essentially. We will share these in class.</p> <p>Part B: During our last class, you will be asked to reflect on your initial vision and how it has changed, if at all, and respond to specific prompts. (<i>Done in-class</i>)</p>	Credit / No Credit	10% Total 5% Each Part	<p>Part A: Jan. 11th</p> <p>Part B: Mar. 8th (completed in class)</p>
3	Artifact Reflection	<p>This assignment aligns with course objective #3.</p> <p>Part A: Working in quads, you will review an artifact of practice teaching (e.g. student work, lesson plan, etc.). What opportunities did you provide for students to engage in the NGSS practice most appropriate to your lesson objective? After sharing and</p>	Credit / No Credit	20% Total 10% Each Part	<p>Part A: Bring Artifact to Class on Jan. 25th</p> <p>Reflection due: Feb. 1st</p>

		<p>discussing your artifact with your partners, you will submit a longer reflection addressing specific prompts inspired by the edTPA.</p> <p>Part B: You'll repeat the procedures in Part A, but this time with a video of your own classroom teaching.</p>			<p>Part B: Share Video with your group by Feb. 1st</p> <p>Watch your partners' videos by class time on Feb. 8th</p> <p>Reflection due: Feb. 15th</p>
4	Unit Planning Checkpoints	<p>This assignment aligns with course objectives #1 and #2.</p> <p>Over the course of the class, you will design a full unit <i>for your teaching context</i>. This assignment will be broken down into specific check-points. At each check-point, you will receive feedback, which you will be expected to incorporate into your final unit submission (see below).</p> <p>Check-Point 1: Unit overview, performance expectations, anchoring phenomenon, essential questions, and SEPs, DCIs, and CCCs.</p> <p>Check-Point 2: Pre-Assessment Task</p> <p>Check-Point 3: Performance Task</p> <p>Check-Point 4: Lesson Sequences</p> <p>Check-Point 5: Full Lesson Plan for one of the Lesson Sequences</p> <p>Check-Point 6: Class Presentation</p>	Credit / No Credit	10%	<p>Part 1: Jan. 18th</p> <p>Part 2: Jan. 25th</p> <p>Part 3: Feb. 8th</p> <p>Part 4: Feb. 22nd</p> <p>Part 5: Mar. 1st</p> <p>Part 6: Mar. 8th</p>
5	Final Unit Plan	<p>This assignment aligns with course objectives #1 and #2.</p> <p>You will submit your final unit, which includes all of the parts above and incorporates the feedback given over the</p>	Criterion Grade	50%	Mar. 14th

		course of the class.			
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Assignment Descriptions

Assignment 1: Readings & Reading Summary (10%)

Readings are due weekly; For your assigned reading summary days, see the chart below.

- Each week there will be assigned readings(s). As class discussions will reference the ideas in these readings, it is your responsibility to come to class prepared to discuss them.
- Twice during the quarter, you will be responsible for writing a summary of the major ideas of the article. The summary is meant to be brief (200 words).
- Additionally, you will be asked respond to two questions:
 - a. Which part of the paper or which idea most resonated with your teaching. Explain. (75-100 words)
 - i. This could be something that you want to try (or have tried) in your classroom; something that excites you about the reading; or something that surprised you. Take this where you want to go with it; we've left the prompt broad for this purpose.
 - b. What questions do you have about this reading? Elaborate on them a bit. (75-100 words)
 - i. Your questions might be about the results, about the translation between theory and practice, or what this might look like in your classroom.

Note: If there is more than one reading for a week, please only summarize the reading with the asterisk (*). Please pay attention to the specific pages for each reading!

How to submit: Add entry to shared Google spreadsheet. Upload spreadsheet link to Canvas.

Week	Assigned Pair
2 - Jan. 11th	Margaret & Jordan
3 - Jan. 18th	Jaime & Christian
4 - Jan. 25th	Jasmine & Aayesha
5 - Feb. 1st	Rachel & Michael
6 - Feb. 8th	Jordan & Jaime
7 - Feb. 15th	Christian & Margaret

8 - Feb. 22nd	Aayesha & Rachel
9 - Mar. 1st	Michael & Jasmine

Assignment 2: Vision of Science Education (10% Total)

Part A (5%): Due before class, Jan. 11, 2021

During our first class, you will sketch your vision for effective science teaching. Based on this in-class activity, write a reflection (250-500 words) in which you:

- a. Briefly explain your vision;
- b. Reflect on how you have enacted aspects of your vision so far this year; and
- c. Target one aspect of your vision to make a goal for this quarter.

How to submit: Submit this assignment as a Word document on Canvas.

Part B (5%): Due by 11:59pm after our last class on March 8, 2021

During our final class, you will reflect on your initial vision for effective science teaching and explain (250-500 words):

- a. How has your vision changed, if at all, based on this past quarter;
- b. What progress did you make toward your goal; and
- c. How might you hold yourself accountable for reflecting on this vision once you graduate from STEP?

How to submit: Submit this assignment as a Word document on Canvas.

Assignment 3: Artifact Reflection (20% Total)

Part A (10%): Bring artifacts to class on Jan. 25th, 2021. Reflection due Feb 1st.

Part of being a good teacher is reflecting on our practice. Working in quads, you will each share an artifact of your practice and discuss the artifact in light of the following questions:

- a. **Central Focus:** What is the goal for the lesson? How does your artifact help students understand relationships between scientific concepts, scientific practices, and the phenomenon in the unit? Identify an aspect of your artifact that is designed to support student learning and engagement with a specific NGSS practice. (It might be helpful to review Appendix F.)
- b. **Knowledge of Students:** How did your knowledge of your students shape how you designed or adapted this artifact? Consider what your students know and can do, as well as their personal, cultural, and community assets.
- c. **Your own specific question:** This question will be shared with your partner when you share your artifact in advance of your meeting.

After your discussion (~20 min each; ~80 min total), you will each submit a reflection (750 words) based on your conversation. Your reflection should address:

- a. **Brief Overview:** What is the artifact? What was the lesson objective? What was the focal NGSS practice?
- b. **Area of Strength:** What was at least one way that you provided an opportunity for students to engage in the specific NGSS practice? (Be specific; cite details from the artifact.)
- c. **Area of Growth:** Based on your conversation, what is one concrete way you could modify this lesson moving forward to better support students in the NGSS practice? (Avoid generalities; “Add more scaffolding.”)
- d. **Partner Insight:** What was the most valuable insight shared by one of your partners? How will you operationalize this insight in your teaching?
- e. **Vision of Science Teaching:** How does this artifact support your target for your vision of effective science teaching? (If it doesn’t, what is an additional change you could make?)

Part B (10%): Share video with your group by Feb. 1st, 2021. Watch your partners’ videos by Feb 8th, 2021. Reflection due Feb 15th.

For Part B, you will reflect on a video of your classroom practice. This can be a video of you implementing your artifact from Part A, but it doesn’t have to be. Working in your quad, you will each share your video and discuss in light of the following questions:

- a. **Learning Environment:** How did you demonstrate mutual respect for, rapport with, and responsiveness to students with varied needs and backgrounds, and challenge students to engage in learning?
- b. **Student Learning & Instruction:** How did you engage students in a focal scientific practice? How did your instruction support students to use science concepts and/or apply scientific practices while they engaged in scientific inquiry?
- c. **Adapting Instruction:** What changes would you make to your instruction next time and why?
- d. **Your own specific question:** This question will be shared with your partner when you share your artifact in advance of your meeting.

After your discussion (~20 min each; ~80 min total), you will each submit a reflection (750 words) based on your conversation. Your reflection should address:

- a. **Brief Overview:** What is the artifact? What was the lesson objective? What was the focal NGSS practice?
- b. **Area of Strength:** What was at least one way that you provided an opportunity for students to engage in the specific NGSS practice? (Be specific; cite details from the artifact.)

- c. Area of Growth: Based on your conversation, what is one concrete way you could modify this lesson moving forward to better support students in the NGSS practice? (Avoid generalities; “Add more scaffolding.”)
- d. Partner Insight: What was the most valuable insight shared by one of your partners? How will you operationalize this insight in your teaching?
- e. Vision of Science Teaching: How does this artifact support your target for your vision of effective science teaching? (If it doesn’t, what is an additional change you could make?)

How to submit: This assignment has multiple steps and due dates.

Part A: 1) Bring your artifact and a question for feedback to class on Jan. 25th. 2) Submit your individual reflection on Canvas by Feb 1st..

Part B: 1) Email your partners, Danny, and Monica with your video and specific question for feedback. This is due on Feb 1st. 2) Watch each of your partners’ videos before class on Feb 8th. 3) Submit your individual reflection on Canvas by Feb. 15th.

Partners:

Group 1 (Physical Sciences): Jaime, Rachel, Michael, & Christian

Group 2 (Biology & Earth): Aayasha, Jasmine, Margaret, & Jordan

Assignment 4: Unit Plan Checkpoints (10%)

Check-Points: Due before class on the days listed below

In this assignment, you will design a unit plan according to the model developed by Wiggins and McTighe (2005) and the Ambitious Science Teaching Framework (Windschitl et al., 2018). The unit plan development is the major assignment of the Winter quarter; however, the construction of the unit will be scaffolded with “check-points.” After each check-point, you will receive feedback that will later be incorporated into your final unit submission. In this way, this assignment is both a learning and assessment task. We will use a unit template for this assignment.

Note: This is meant to be a planning exercise. While you can choose a unit that you will teach this quarter, it should come after you’ve had a chance to plan (~late Feb/early March).

Check-Point 1: Due before class, Jan. 18th, 2021

The first aspect of the unit construction contains the big picture ideas for the unit. Using the planning template, please complete:

- a. **Unit overview:** This set of two slides includes a description of the learning context that addresses both the students and the science content you will

address; an explanation of who your students are; the teacher rationale for why you believe students should learn this material; and the student rationale for why you think students would be excited to learn this material and how it is relevant to their lives.

- b. **Performance expectations:** This slide lists all performance expectations you intend to assess over the course of the unit and the associated foundation boxes.
- c. **Anchoring phenomenon:** The phenomenon that students will explore throughout the unit. Phenomena are observable and can arise from either a natural or designed system. ([More detail about Anchoring Phenomena here](#)).
- d. **Phenomenon-driven question:** The question students will be able to answer at the end of the unit, related to the phenomenon and includes both an SEP and DCI.
- e. **Essential question:** It is important that your unit addresses a question designed to “guide student inquiry toward a deeper understanding of a big idea” (Wiggins & McTighe, 2005, p. 116) and whose answer will be understood by studying your unit. This question should be central to science and promote inquiry. Students’ answers to this question at the end of the unit will shed light on their learning related to the enduring understandings.
- f. **20 sec Story/Enduring Understandings:** Based on the DCIs, SEPs, and CCCs for your unit, what do you want students to remember in 20 years? In other words, what is your 20 sec story? While this could be part of your anchoring phenomenon, it does not have to be.

How to submit: Upload your Planning Template link to Canvas

Check-Point 2: Due before class, Jan. 25th, 2021

Using the planning template, please complete your pre-assessment plan. Consider the following: How will you assess students’ prior knowledge of the Anchoring Phenomenon or the core ideas associated with your Essential Question? Design the pre-assessment that you would use with your students. Remember to think about putting the science into a context!

How to submit: Upload your Planning Template link to Canvas, with your Pre-Assessment linked on the correct slide.

Check-Point 3: Due before class, Feb. 8th, 2021

Using the planning template, please design the performance assessment task that you will use with students. Consider the following: How will you know what students know and are able to do at the end of the unit? Develop a unit – sometimes called a

summative or performance – assessment. This submission should include 1) the student-facing prompt and 2) a draft of a rubric. Draw from our discussions this Summer and Fall when thinking about your assessment. Particularly, consider how to make your assessment multi-dimensional so that it addresses the DCIs, CCCs, and SEPs associated with your unit.

How to submit: Upload your Planning Template link to Canvas, with your Performance Assessment linked on the correct slide.

Check-Point 4: Due before class, Feb. 22nd, 2021

Using the planning template, please plan out your lesson sequences. In the Fall quarter, we developed lesson segments and lesson plans. Some of these lessons were on the same idea/topic, and even though they had their own lesson objective and assessment, they were part of the same sequence. Here you will describe the focus of 4-6 lesson sequences (roughly 2-3 days of instruction) and the specific lesson objectives. The lesson objectives should draw upon the NGSS, and make clear what DCIs will be included, what SEPs will be addressed, and any CCCs that will be assessed. Keep in mind that how you sequence your lessons tells a narrative – what story are you telling?

How to submit: Upload your Planning Template link to Canvas, with the Lesson Sequence Slides completed

Check-Point 5: Due before class, Mar. 1st, 2021

Using the planning template, plan one complete lesson sequence. For one of your lesson sequences (it does not have to be the first one), you will draft each of the lesson plans. Each lesson plan should include lesson timing; lesson topic; NGSS performance expectations addressed; lesson learning objectives; instructional resources; a timeline of instructional tasks with times, student actions, teacher actions, and opportunities for formative assessment; language demands; language supports; accommodations, modifications and scaffolds; and relevant theories. Note: For this assignment, please choose a Lesson Sequence with 3 Lessons.

How to submit: Upload your Planning Template link to Canvas, with the one Lesson Series linked on the appropriate slide (from the Lesson Sequence overview)

Check-Point 6: Due in class, Mar. 8th, 2021

You will have 5-8 minutes to present your unit to your classmates. Focus on the big picture, rationales, phenomena, and how you will know what students have learned. Think of this as a way to help others in the group get creative teaching ideas.

How to submit: No submission needed.

Assignment 5: Final Unit Plan (50%)

Due on March 14th, 2021 by noon.

Based on the feedback that you received from each check-point, make adjustments to your unit plan. Please address comments in a different color font to see how your unit evolved during the quarter.

How to submit: Upload a link of your complete and modified Unit Plan with all components linked to Canvas

Access and Accommodations

If you are a student who needs academic accommodations due to a disability, please register with the Office of Accessible Education (OAE). Professional staff will evaluate your needs, support appropriate and reasonable accommodations, and prepare an Academic Accommodation Letter for faculty. To get started, or to re-initiate services, please visit oae.stanford.edu.

If you already have an Academic Accommodation Letter, please share your letter with us at the earliest possible opportunity. We want to partner with you and OAE to ensure that this course is accessible and inclusive for all of our students.

Stanford Honor Code

You are expected to follow the Stanford Honor Code. If you have any questions about how it applies to a particular assignment, please ask.

For an explanation of the Honor Code, please go to:

<https://communitystandards.stanford.edu/policies-and-guidance/honor-code>

Weekly Readings & Assignments

Note: A (*) indicates that this is the article to summarize for the reading summary pair.

Week	Lesson Focus & Readings Due	Assignments Due
1 Jan 4	Introduction to Winter Quarter <ul style="list-style-type: none"> - NGSS Appendix F (p. 1-3; Skim 4-33: the practices) - Lowell, B. R., & McNeill, K. L. (2019). Keeping critical thinking afloat. <i>Science Scope</i>, (August), 64–69. - NGSNavigators Podcast. Justice-Centered Science Pedagogy with Daniel Morales-Doyle. Link here. (Listen from 0:00 - 12:00) 	<i>Assigned readings (due this week and each week thereafter)</i>
2 Jan 11	Planning for Engagement with Big Ideas <ul style="list-style-type: none"> - Windschitl, M., Thompson, J., & Braaten, M. (2018). <i>Ambitious science teaching</i>. Harvard Education Press: Cambridge, MA. (p. 1-12; 25-36) - Emerling, B., & Graff-Emerling, G. (2016). Every lesson needs a Storyline. <i>Educational Leadership</i>. ASCD. - *Stoll, L., & Schultz, S. (2019). How to Design a Performance Task. <i>Science Scope</i>, 042(07), 40–45. https://doi.org/10.2505/4/ss19_042_07_40 	Vision of Science Education – Part A Reading Summary: Margaret & Jordan
3 Jan 18	Eliciting & Honoring Students’ Ideas <ul style="list-style-type: none"> - Bang, M., Brown. B., Calabrese-Barton, A., Rosebery, A. and Warren, B. (2017) Chapter 3: Towards a more Equitable Learning in Science: Expanding Relationships Among Students, Teachers and Science Practices. <i>Helping students make sense of the world using next generation science and engineering practices</i>, 33-58. 	Unit Plan Checkpoint 1 Reading Summary: Jaime & Christian
4 Jan 25	Science Models & Modeling <ul style="list-style-type: none"> - *Windschitl, M., & Thompson, J. (2013). The modeling toolkit: Making student thinking visible with public representations. <i>The Science Teacher</i>, 80(6), 63-69 - Matuk, C., Hurwich, T., Spiegel, A., & Diamond, J. (2019). How do teachers use comics to promote engagement, equity, and diversity in science classrooms?. <i>Research in Science Education</i> (pp. 1-9). 	Unit Plan Checkpoint 2 Artifact Reflection Part A: Bring Artifact to Class Reading Summary: Jasmine & Aayesha
5 Feb 1	Supporting Changes in Students’ Thinking <ul style="list-style-type: none"> - *http://ambitiousscienceteaching.org/wp-content/uploads/2014/08/Primer-Supporting-Changes-in-Thinking.pdf (pp. 1-8) 	Artifact Reflection Part A: Reflection due Artifact Reflection Part B:

	<ul style="list-style-type: none"> - Patterson, A. D. (2019). Equity in groupwork: The social process of creating justice in a science classroom. <i>Cultural Studies of Science Education</i>, 14(2), (read 361–364, skim 365-371, read 371-379). 	<p>Share Video w/ your Group</p> <p>Reading Summary: Rachel & Michael</p>
6 Feb 8	<p>Collective Understanding</p> <ul style="list-style-type: none"> - Windschitl, M., Thompson, J., & Braaten, M. (2018). <i>Ambitious science teaching</i>. Harvard Education Press: Cambridge, MA. (p. 187-97) - *Emdin, C. (2011). Moving beyond the boat without a paddle: Reality pedagogy, Black youth, and urban science education. <i>The Journal of Negro Education</i>, 286-291. 	<p>Unit Plan Checkpoint 3</p> <p>Artifact Reflection Part B: Watch Partners' Videos Before Class</p> <p>Reading Summary: Jordan & Jaime</p>
7 Feb 15	<p>Making & Justifying Claims</p> <ul style="list-style-type: none"> - *Osborne, J. (2010). Arguing to Learn in Science: The Role of Collaborative, Critical Discourse. <i>Science</i>, 328, 463-466. - Michaels, S., & O'Connor, C. (2012). Talk science primer. Cambridge, MA: TERC. pp. 10-20 	<p>Artifact Reflection Part B: Reflection due</p> <p>Reading Summary: Christian & Margaret</p>
8 Feb 22	<p>Evidence-based Explanations</p> <ul style="list-style-type: none"> - Berland, L. K., & Reiser, B. J. (2009). Making sense of argumentation and explanation. <i>Science education</i>, 93(1), 26-55 (Read p. 26-35) 	<p>Unit Plan Checkpoint 4</p> <p>Reading Summary: Aayesha & Rachel</p>
9 Mar 1	<p>Assessment</p> <ul style="list-style-type: none"> - *Kloser, M., Borko, H., Martinez, J. F., Stecher, B., & Luskin, R. (2017). Evidence of Middle School Science Assessment Practice From Classroom- Based Portfolios. <i>Science Education</i>, 101(2), 209-231. (Read p. 211-215: Background Literature) - https://www.nsta.org/blog/achieving-equity-through-assessments 	<p>Unit Plan Checkpoint 5</p> <p>Reading Summary: Michael & Jasmine</p>
10 Mar 8	<p>Bringing It Together & Looking Forward</p> <ul style="list-style-type: none"> - Patterson, A., & Gray, S. (2019). Teaching to transform: (W)holistic science pedagogy. <i>Theory Into Practice</i>, 0(0), 1–10. https://doi.org/10.1080/00405841.2019.1626616 	<p>Unit Plan Checkpoint 6</p> <p>Vision of Science Education – Part B (done in class)</p>