

**San José State University**  
**College of Science – Science Education Program**  
**Course Number 40354, Secondary School Science, Section-01, Spring 2020**

**COURSE CONTACTS & INFORMATION**

<b>Instructor:</b>	Dr. Tammie Visintainer
<b>Office Location:</b>	Sweeney Hall 338 (SH 338)
<b>Telephone:</b>	(408) 924-3778
<b>Email:</b>	tammie.visintainer@sjsu.edu (best contact, do not email through Canvas)
<b>Office Hours:</b>	Tuesdays 2-3 (SH 106 LCOE Student Success Center) and by appointment
<b>Class Days/Time:</b>	Tuesday 4:00PM – 10:00PM
<b>Classroom:</b>	Duncan Hall 246
<b>Prerequisites:</b>	CSETs 118, 119, and one specialized area, and secondary science education adviser approval

### **Course Format**

#### **Technology Intensive, Hybrid, and Online Courses (Required if applicable)**

This class is a hybrid course, with a required online component. Copies of the course materials such as the syllabus, major assignment handouts, etc. may be found by logging in to our Canvas web page at [sjsu.instructure.com](https://sjsu.instructure.com). If you are registered for the course, you should be able to find this course under the “courses” tab. You are responsible for regularly checking the Canvas webpage. Participation is expected in all online events. It is the student’s responsibility to check Canvas for announcements, email messages, or additions/changes to assignments.

**Note: This course will require frequent use of a computer for lesson design and for use in instructional practice.**

### **COURSE OVERVIEW**

#### **Course Description**

This course is designed to engage teacher candidates in the methods, learning theories, practices, and instructional and pedagogical approaches for teaching science in secondary schools. As an integral part of the single-subject credential program, teacher candidates will develop strategies, master techniques, and gain practice-based experience in the promotion of inquiry-based, learner-centered classrooms. Teacher candidates will learn to design equitable and authentic science learning experiences for diverse student populations. To do this, teachers will learn to create design principles and unit and lesson plans that build from students’ experiences and sense making practices, engage them in the Next Generation Science Standards (NGSS) and use technology to enhance the learning environment.

#### **Course Goals and Vision**

The goal of this course is to create reflective and responsive *science teachers, designers, and agents of social change* who empower students, especially those from populations historically/currently marginalized in society, school, and science, as learners and doers of science, and change agents in their communities.

Guiding questions for the course are as follows:

- What are current issues of equity in science education? How do we teach science for equity and inclusion and in ways that meet the needs of diverse student populations?
- How do we empower students as capable learners and doers of science through our instruction and pedagogical approaches?
- How do we teach science as inquiry and engage students meaningfully in science practices?
- How do we build on students' diverse ways of knowing and sense making practices as resources for our instruction?

## **Course Learning Outcomes**

Through course readings, class discussions and activities, and teaching practice you will:

- Create a science teaching philosophy that reflects your commitments to science as a discipline and your vision for teaching students from racially, ethnically, and socioeconomically diverse populations.
- Explore how to teach science in ways that are equitable, inclusive, and reflect current theories of learning
- Learn instructional and pedagogical approaches to engage students in science inquiry and authentic science practices
- Design a unit and lesson plans that center equity, engage students in critical thinking and inquiry, and address California State and Next Generation Science Standards.
- Model teaching practice that demonstrates an understanding of relationships between content knowledge, pedagogical knowledge, theories of learning, and knowledge of students in design and implementation of lessons and activities.
- Differentiate instruction in ways that centers inclusivity and supports students' diverse ways of knowing, learning, and sense making practices.

## **Opportunities & Challenges of This Course**

Becoming a secondary science teacher is an exciting and noble endeavor! There are many exciting adventures in your future. In this course, we will engage in and reflect on what it means to teach in ways that address contemporary goals and issues in science education. You will construct a vision for what teaching science means and looks like, and why teaching for equity is important and central to student learning and empowerment. As exciting as this is, this course will also be challenging. You will be challenged to explore and teach science in ways you may not have experienced in your own schooling. While this may seem daunting, we will experience and practice strategies together and support you in engaging in science practices in authentic ways.

## **Creating a Learning Community**

As educators, we are first and foremost learners (professors included!). Teaching is a journey and there will always be ways to grow and improve. Thus, it is important that I create a safe and comfortable learning environment where teacher candidates can explore, make mistakes, learn, and grow as professionals together. In return, I ask that you be open to new instructional and pedagogical approaches and ways of engaging with and doing science. In addition, I ask that you be open to new ways of seeing your students as young people, creators, learners, and doers of science.

## **Primary Teacher Performance Expectations (TPE's) addressed in SCED 173**

- TPE 1: Engaging and Supporting All Students in Learning (1.1, 1.3, 1.5)
- TPE 2: Creating and Maintaining Effective Environments for Student Learning (2.2, 2.5)
- TPE 3: Understanding and Organizing Subject Matter for Student Learning (3.1, 3.2, 3.7)
- TPE 4: Planning Instruction and Designing Learning Experiences for All Students (4.4, 4.8)
- TPE 5: Assessing Student Learning (5.1, 5.3)
- TPE 6: Developing as a Professional Educator (6.1, 6.2, 6.3)

## Required Texts & Readings

- **A Framework for K-12 Science Education** (*download free pdf*): <https://www.nap.edu/catalog/13165/a-framework-for-k-12-science-education-practices-crosscutting-concepts>
- **STEM Teaching Tools:** Free resources to support NGSS Implementation: [STEMTeachingTools.org](http://STEMTeachingTools.org)
- Science Safety Handbook for CA Public Schools: <http://goo.gl/cj6aHe>
- **The majority of readings will be posted on the Canvas course site.** Additional resources and materials will be available on Canvas and/or distributed in class.

## Helpful NGSS Lesson Design Resources

- Next Generation Science Standards, California Department of Education  
<http://www.cde.ca.gov/pd/ca/sc/ngssintrod.asp>
- National Science Teacher Association (NSTA)
- Next Generation Science Standards Webinars  
[https://learningcenter.nsta.org/products/symposia\\_seminars/NGSS/webseminar.aspx](https://learningcenter.nsta.org/products/symposia_seminars/NGSS/webseminar.aspx)

## COURSE EXPECTATIONS

**Class Meetings & Participation:** Classes will consist of discussions, activities, visits from expert teachers, and teaching practice. Please complete assignments on time and come to class prepared to engage in our learning community.

- **Participation:** The course is designed as a practicum, thus, active participation is essential to learning/growing as an educator and your success in the course. Students are graded on the quality of participation in class and on-line.
- **Attendance:** Class attendance is required and students are expected to attend every class, arrive on time, and stay for the entire period to receive full credit.
- **Missing class:** Attending weekly class sessions is required and expected. If you must miss a class, please discuss this with the instructor well in advance. *Please email the instructor as soon as possible if an unforeseen emergency prevents you from attending class, or causes you to be late.*
- **Tardiness:** Class begins at 4pm. **Please arrive on time and ready to begin at 4pm.** Repeated tardiness (arriving after 4pm) will negatively impact your participation grade. Extreme tardiness (arriving  $\geq 30$  min late) will be counted as an absence.

**Readings:** To expand the breadth and depth of your thinking, understanding, and professional growth you are responsible for completing weekly required readings. All readings will be accessible on Canvas (***Readings must be completed prior to class***). Come to class prepared to engage in discussions of the assigned material.

- **Canvas On-Line Reading Discussion Forum:** Each week there will be guiding questions posted under Canvas “Discussions.”
- You are required to participate in the Canvas discussion **DUE MONDAY NIGHT by 10PM** (see Assignments)

**Course Projects & Assignments:** Course projects and assignments are discussed in detail below. Expectations, grading, and deadlines for all assignments will be clearly communicated in advance.

- Late work is subject to penalty depending on the severity of the lateness
- Due Dates: Electronic copies of written assignments are **DUE on Tuesday BEFORE the start of class (see “Assignments” for submission).**

**Technology Use:** Please refrain from phone/computer/technology use during class sessions unless you are taking notes and/or using your computer for other class activities.

As per Academic Senate resolution, “*Success in this course is based on the expectation that students will spend, for each unit of credit, a minimum of forty-five hours over the length of the course (normally 3 hours per unit per week with 1 of the hours used for lecture) for instruction or preparation/studying or course related activities. Other course structures will have equivalent workload expectations as described in the syllabus.*” To satisfy the requirement for a 3-unit class, students should spend a total of 135 hours on this class during the semester for an average of eight to nine hours per week.

## DETERMINATION OF GRADES

- **Participation & Class Assignments = 60% of Final Grade**
  - Demonstration of teaching practices – 15
  - Course participation – 20
  - Course assignments – 25
  
- **Final Project: Teaching Portfolio = 40% of Final Grade**
  - Lesson plans (2 total) – 20
  - Unit Plan – 10
  - Teaching Statement & Philosophy of Equity (Final Version) – 5
  - Design Principles for Equity (Final Version) - 5

**Additional Grading Information:** *The lesson plans and unit plan for this course will be evaluated in accordance to rubrics (included separately). Additional rubrics will be used for grading teaching practice, participation, and assignments. More guidelines on grading and class attendance can be found from the following two university policies:*

- *University Syllabus Policy S16-9* (<http://www.sjsu.edu/senate/docs/S16-9.pdf>)
- *University policy F15-12* (<http://www.sjsu.edu/senate/docs/F15-12.pdf>)

A letter grade will be determined according to the percentage of available points that each student has earned. There are no extra credit options for this course.

<u>% of Points</u>	<u>Grade</u>	<u>Reported Student Achievement Earned</u>
97-100%	A+	
94-96%	A	Exceeds <i>Teaching Performance Expectations (TPE)</i>
90-93%	A-	
87-89%	B+	
84-86%	B	Meets <i>Teaching Performance Expectations</i>
70-83%	C-	Minimally meets <i>Teaching Performance Expectations</i>
67-69%	D+	
64-66%	D	Provides little evidence for meeting (TPE)
60-63%	D-	
Below 60%	F	Does not meet (TPE)

### **\*\*Important Note on Course Requirements\*\***

- **In order to qualify for Supervised Student Teaching (SCED184Y and/or Z), a grade of B or higher (B - not accepted) must be earned in SCED 173.**
- Since the course number is an undergraduate number, **the university does not allow students to repeat undergraduate courses if they earn grades of C or better**
- As a result, no grades of B-, C+, or C will be assigned. Instead, if your grade should be 83% or lower, the grade scale has been adjusted to ensure that you can retake the course.

**Grading Policy for Written Assignments:** All work submitted is expected to meet high standards of professional quality in content, style, and use of standard English. Written assignments and presentations will be graded based on criteria according to rubrics distributed in advance of the due date. **All assignments are to be submitted on or before their due dates/times to be eligible for full credit.**

**Teaching practice:** Student lesson components and practice are to be performed as scheduled. In cases of serious illness or in an emergency situation the instructor will allow a one-time deadline extension on any written assignment other than the final unit plan. The new deadline will be final.

## COURSE ASSIGNMENTS & REQUIREMENTS

**Educational Autobiography:** At the beginning of the semester you will prepare an educational autobiography, a short (~2 pages) statement about who you are – as a person, SJSU student, science person, and prospective science teacher – with particular emphasis on your experiences with school in general and with science class in particular. In addition, include any experiences with science beyond K-12 schooling that have been formative for you. The details you choose to include are entirely up to you. The purpose is for me to get to know you and for you to get to know each other. NOTE: The instructor will read all autobiographies and you will share them in class.

**Teaching Statement & Philosophy of Equity:** One of the core application components for teaching positions is a teaching statement. At the beginning of the course, you will write a draft of your vision and commitments for teaching science – how you envision teaching science, your core values, what you hope your students will *do* with science based on their experiences in your classroom, and what teaching science for equity and inclusion means to you. Throughout the semester you will experience new readings, science teaching practices, and theories of learning. At the end of the semester you will revise your draft to reflect your current commitments and core values based on your experiences in the course. The final version of your Teaching Statement & Philosophy of Equity will be part of your final project for the course.

**Reading Discussion Forum:** To expand the breadth and depth of your thinking, understanding, and professional growth you are responsible for completing weekly required readings.

- **Canvas On-Line Reading Discussion Forum:** Each week there will be guiding questions posted under Canvas “Discussions.” You are required to participate in the discussion by reflecting on/responding to the prompts.
- You will be graded for responding thoughtfully and thoroughly to the questions.
- **Responses to the on-line discussion are DUE on MONDAY NIGHT by 10PM**

**Science Journal: Teaching Resource Cultivation:** A central aspect of growing as an educator is inquiring into your own practice and cultivating networks and resources that support your teaching and learning endeavors. Throughout the semester you are encouraged to **keep a science journal** as a way to document your growth and create a collection of teaching resources such as class notes, podcasts, videos, and websites. In addition, entries be a place to write questions, reflections, and inquiries into your practice. Journals will not be graded for content (the purpose is to enhance your professional growth). Engaging in this practice serves as a model that you may choose to use with your own students.

**Science Self-Documentation Project:** An exciting and challenging aspect of teaching science is engaging students meaningfully in science and in ways that have purpose and are relevant to their lives and interests. To help foster creativity in your instructional design, we will ask you to notice and document science phenomena and the relevancy of science across the many contexts of your life. The goal is to notice, reflect on, and think about science in new and expansive ways.

**Design Principles for Teaching Science for Equity:** Based on course readings, guest speakers, and experiences, you will create an annotated list of design principles that promote the design of equitable science learning environments (teaching, learning, pedagogy, instruction). The design principles provide an opportunity for you to synthesize readings, accumulated knowledge, and experiences from the course. They will serve as guidelines that reflect your philosophy and goals for teaching science and provide the foundation for your unit and lesson plan design.

**Lesson Plans:** A key element of this course is for you to learn how to design a set of lesson plans involving science phenomena that are inquiry-based and NGSS aligned. We will introduce you to a lesson plan template that will guide your design. You will be asked to develop two full lesson plans for your final project. Details and components of the full lesson plans will be described during review of the lesson plan template. We will build and practice components of the lesson plan throughout the semester.

**Unit Plan:** Throughout the course, we will explore how to structure a unit. While you will not be asked to create a full unit plan, as part of your final project you will be asked to create a unit plan overview and outlines that includes your two detailed lesson plans. You will be provided with a unit plan template. In addition, your plan will include a description of the goals of the unit including how you plan to incorporate inquiry and equity throughout the unit.

### Final Project – Science Teaching Portfolio

The culminating project for the course is a portfolio that includes the following components:

- Lesson plans (2 total)
  - Must be inquiry-based and NGSS aligned
  - Must use provided lesson plan template
  - Must include details of all required lesson plan components
- Unit Plan:
  - Must use provided unit plan template
  - Must include details for all unit plan components
- Final version of Teaching Statement & Philosophy of Equity
- Final version of Design Principles for Teaching Science for Equity

### Dropping and Adding

Students are responsible for understanding the policies and procedures about add/drop, grade forgiveness, etc. Refer to the current semester’s [Catalog Policies](http://info.sjsu.edu/static/catalog/policies.html) section at <http://info.sjsu.edu/static/catalog/policies.html>. Add/drop deadlines can be found on the [current academic calendar](http://www.sjsu.edu/provost/Academic_Calendars/) web page: [http://www.sjsu.edu/provost/Academic\\_Calendars/](http://www.sjsu.edu/provost/Academic_Calendars/)

The [Late Drop Policy](http://www.sjsu.edu/aars/policies/latedrops/policy/) is available at <http://www.sjsu.edu/aars/policies/latedrops/policy/>. Students should be aware of the current deadlines and penalties for dropping classes. Information about the latest changes and news is available at the [Advising Hub](http://www.sjsu.edu/advising/) at <http://www.sjsu.edu/advising/>

### University Policies

Per University Policy S16-9, university-wide policy information relevant to all courses, such as academic integrity, accommodations, etc. will be available on Office of Graduate and Undergraduate Programs’ [Syllabus Information web page](http://www.sjsu.edu/gup/syllabusinfo/) at <http://www.sjsu.edu/gup/syllabusinfo/>

## COURSE OUTLINE

Following is an outline of when topics are anticipated to be covered. Please note, **this syllabus is a living document** – modifications will be made as we progress through the semester. Each week a more detailed agenda will be provided. **The syllabus will be regularly updated/posted on Canvas to reflect the current topics.**

*Note: All readings are available through Canvas, unless otherwise stated.*

Week	Date	THEMES & GOALS
1	January 28	<p><b>Introduction to Science Teaching &amp; Learning</b></p> <p><b>Goal:</b> We will begin to form a learning community by starting to grapple with the guiding questions of the course, engaging in inquiry together, and reflecting on our varied experiences with science.</p>

2	Feb 4	<p style="text-align: center;"><b>Equity &amp; Justice in Science Education: Overview of Challenges &amp; Opportunities</b></p> <p><b>Goal:</b> We will engage in and think critically about big broad issues in education generally, and science education specifically, and explore the current goals for science teaching and learning. In addition, we will explore what how you, as teachers, can become agents of social change.</p> <p><b>Assigned Readings to Be Completed <u>Before</u> this Class:</b></p> <ul style="list-style-type: none"> <li>• Chap 1: The Flat World, Educational Inequality, and America’s Future, In Darling-Hammond, L. (2010). <i>The Flatworld and Education</i>, Teachers College Press, p.1-26</li> <li>• Position Statement NSTA: The Next Generation Science Standards (2016). <i>National Science Teachers Association</i>, p.1-6.</li> </ul> <p><b>Optional Reading:</b></p> <ul style="list-style-type: none"> <li>• Chap 2. The Anatomy of Inequality: How the Opportunity Gap is Constructed, In Darling-Hammond, L. (2010). <i>The Flatworld and Education</i>.</li> </ul> <p><b>Assignment Due: <i>Educational Autobiography</i></b></p>
3	Feb 11	<p style="text-align: center;"><b>Developing a Vision: Empowering Students as Learners &amp; Doers of Science</b></p> <p><b>Goal:</b> We will explore connections between an instructor’s vision of science and their students, the design of instructional/pedagogical resources, and shifts that occurred for youth through while they engaged in community-based scientific research. In addition, we will explore how to leverage contemporary science as foundations for instructional units.</p> <p><b>Assigned Readings to Be Completed <u>Before</u> this Class:</b></p> <ul style="list-style-type: none"> <li>• Visintainer, T. (2017). “Scientists Do What We Do”: Empowering Youth of Color as Learners and Doers of Community-Based Scientific Research. In D. Stroupe (Ed.), <i>Reframing Science Teaching and Learning: Students and Educators Co-Developing Science Practices In and Out of School</i>. Routledge.</li> <li>• Chapter 2: Guiding Assumptions &amp; Organization of the Framework (p. 23-34), <i>Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas</i> (see link under “required texts”)</li> <li>• Early Gender Gaps in Mathematics and Teachers’ Perceptions. National Science Board. Science &amp; Engineering Indicators Report 2018</li> </ul>
4	Feb 18	<p style="text-align: center;"><b>Theories of Learning: Science, Culture &amp; Inquiry</b></p> <p><b>Goal:</b> We will explore how students learn and understand science as well as approaches to teaching science that engage in inquiry and authentic science practices. In addition, we will engage an inquiry activity with varying levels of scaffolding in order to experience different instructional approaches to inquiry as learners.</p> <p><b>Assigned Readings to Be Completed <u>Before</u> this Class:</b></p> <ul style="list-style-type: none"> <li>• Nasir, N.S., Rosebery, A., Warren, B., &amp; Lee, C.D. (2006). Learning as a Cultural Process: Achieving Equity Through Diversity. In R.K. Sawyer (Ed.), <i>The Cambridge Handbook of the Learning Sciences</i> (pp. 489-504). Cambridge, UK: Cambridge University Press.</li> <li>• Bang, M. Learning and Culture. <i>Institute for Science + Math Innovation</i>, p.1-3.</li> </ul>

		<ul style="list-style-type: none"> <li>• Wilcox, Kruse, &amp; Clough (Sept, 2015). Teaching Science Through Inquiry: Seven Common Myths About This Time-Honored Approach. <i>The Science Teacher</i>, p.62-67.</li> </ul> <p><b>Optional Reading:</b></p> <ul style="list-style-type: none"> <li>• Chap 1: Learning, From Speculation to Science. In Bransford, J.D., Brown, A.L., Cocking, R.R. (2000). <i>How People Learn</i>. National Academies Press, Washington D.C.; p. 3-27</li> </ul> <p><b>Assignment Due: Draft of Teaching Statement and Philosophy</b></p>
5	Feb 25	<p style="text-align: center;"><b>Overview: Next Generation Science Standards</b></p> <p><b>Goal:</b> We will explore the rationale for shifting to NGSS, the components of this reform, how they fit together, and what this means for teaching science. In addition, we will begin to dig into the standards and you will explore the Disciplinary Core Ideas and Performance Expectations for your discipline. Finally, we will explore how to build on our own experience documenting science in our lives as we design instruction.</p> <p><b>Assigned Readings to Be Completed Before this Class:</b></p> <ul style="list-style-type: none"> <li>• NSTA Transitioning from Scientific Inquiry to 3D Teaching and Learning.</li> <li>• Practice Brief 32: Why Focus on Science and Engineering Practices? Why is “The Scientific Method” Mistaken? (<a href="http://stemteachingtools.org/brief/32">http://stemteachingtools.org/brief/32</a>)</li> <li>• Practice Brief 2: Why Should Students Investigate Contemporary Science Topics and Not Just “Settled” Science? (STEMTeachingTools.org)</li> <li>• Practice Brief 31: How to Launch STEM Investigations That Build on Student and Community Interests and Expertise (<a href="http://stemteachingtools.org/brief/31">http://stemteachingtools.org/brief/31</a>)</li> <li>• Science Self-Documentation Classroom Example (<a href="http://stemteachingtools.org/sp/self-doc">http://stemteachingtools.org/sp/self-doc</a>)</li> </ul> <p><b>Assignment Due: Science-Self Documentation Project</b></p>
6	March 3	<p style="text-align: center;"><b>NGSS Part 2: Science &amp; Engineering Practices</b></p> <p><b>Goal:</b> We will explore the NGSS science and engineering practices, and practice designing an elicit and engage activity for an opening to an NGSS lesson.</p> <p><b>Assigned Readings to Be Completed Before this Class:</b></p> <ul style="list-style-type: none"> <li>• Bang, M., Brown, B., Calabrese Barton, A., Rosebery, A., &amp; Warren, B. (2017). Chapter 3: Toward More Equitable Learning in Science: Expanding Relationships Among Students, Teachers, and Science Practices. In: <i>Helping Students Make Sense of the World Using Next Generation Science and Engineering Practices</i></li> <li>• Chapter 3: Scientific &amp; Engineering Practices in a <i>Framework for K-12 Science Education</i>: (p.41-82)</li> </ul> <p><b>Assignment Due: NGSS DCI &amp; PE Table for your discipline</b></p>

7	March 10	<p style="text-align: center;"><b>Teaching Science for Equity Part 1: Race, Identity, Learning &amp; Scientific Literacy</b></p> <p><b>Goal:</b> We will explore how we “see” our students and discuss how to get to know them as individuals, learners, and dreamers. To do this, we will: 1) Reflect on our assumptions about race, class, culture, community, 2) Discuss ways to create a supportive and inclusive classroom culture, and 3) Examine intersections of identity, learning, and teaching approaches that support students’ diverse interests and sense making practices.</p> <p><b>Assigned Readings to Be Completed <u>Before</u> this Class:</b></p> <ul style="list-style-type: none"> <li>• Nasir, N.S. (2012): Chap 3. Wrestling with Stereotypes, In: <i>Racialized Identities, Race and Achievement Among African American Youth</i>. Stanford University Press, Stanford, CA.</li> <li>• Woodson, Jacqueline (2016). South Carolina. In: <i>This Land Is Our Land, New York Times Magazine</i>, November 20, 2016.</li> <li>• Nasir, N.S. Race, Identity, and Equity in Education. <i>The180 Podcast, Turnaround for Children</i>, 1/8/2020 (<a href="https://www.podbean.com/ew/pb-mqcee-ce6a63">https://www.podbean.com/ew/pb-mqcee-ce6a63</a>)</li> </ul> <p><b>Teaching practice: Present Elicit &amp; Engage lesson opening in class</b></p>
8	March 17	<p style="text-align: center;"><b>Teaching Science for Equity Part 2: Equitable Approaches to Science Instruction</b></p> <p><b>Goal:</b> We will explore intersections of culture and science, what it means to teach science in culturally relevant ways, and other equitable/inclusive approaches to science teaching.</p> <p><b>Assigned Readings to Be Completed <u>Before</u> this Class:</b></p> <ul style="list-style-type: none"> <li>• Calabrese Barton, A. (2003). Chapter 2: Learning with Urban Youth. In: <i>Teaching Science for Social Justice</i>. Teachers College Press, New York, NY.</li> <li>• Ladson-Billings, G. (1995). But That’s Just Good Teaching! The Case for Culturally Relevant Pedagogy. <i>Theory Into Practice</i>, 34(3), 159-165.</li> <li>• Boaler, J. (2006). How a Detracked Mathematics Approach Promoted Respect, Responsibility, and High Achievement. <i>Theory into Practice</i> 45 (1), 40-46.</li> </ul> <p><b>Optional Reading:</b> Moll, L.C., Amanti, C., Neff, D., Gonzalez, N. (1992). Funds of Knowledge for Teaching: Using a Qualitative Approach to Connect Homes and Classrooms. <i>Theory Into Practice</i> 31 (2), 132-141.</p>
9	March 24	<p style="text-align: center;"><b>Scientific Literacy</b></p> <p><b>Goal:</b> We will explore aspects of our teaching through video segments, explore in NGSS in equitable and inclusive ways.</p> <p><b>Assigned Readings to Be Completed <u>Before</u> this Class:</b></p> <ul style="list-style-type: none"> <li>• Chap 4: The Role of Practices in Scientific Literacy. In: <i>Helping Students Make Sense of the World Using Next Generation Science and Engineering Practices</i></li> <li>• Practice Brief 3: How to sequence practices in a cascade to support student investigations (<a href="http://stemteachingtools.org/brief/3">http://stemteachingtools.org/brief/3</a>)</li> </ul> <p><b>Due: Teaching reflection: video reflection from lesson opening</b> <b>Due: Scientific literacy: Position statement (discussion)</b></p>

10	March 31	<b>NO CLASS SPRING BREAK</b>
11	April 7	<p style="text-align: center;"><b>Scientific Literacy for Diverse Student Populations</b></p> <p><b>Goal:</b> We will review our design principles as we begin to explore how design learning experiences for diverse learners. In addition, we will explore how to use science practices to promote scientific literacy for diverse student populations.</p> <p><b>Assigned Readings to Be Completed <u>Before</u> this Class:</b></p> <ul style="list-style-type: none"> <li>• Practice Brief 15: Overview: How can we promote equity in science education? (<a href="http://stemteachingtools.org/brief/15">http://stemteachingtools.org/brief/15</a>)</li> <li>• Practice Brief 27: Engaging English Learners in the Science and Engineering Practices. (<a href="http://stemteachingtools.org/brief/27">http://stemteachingtools.org/brief/27</a>)</li> </ul> <p><b>HW: Research and present learning technology for use in the science classroom</b></p>
12	April 14	<p style="text-align: center;"><b>Technology in the Science Classroom</b></p> <p><b>Goal:</b> We will explore different types of learning technologies that can be used in your science teaching (e.g., simulations, real-time data, models etc). You will present the technology you explored to the class.</p> <p><b>Assigned Readings to Be Completed <u>Before</u> this Class:</b></p> <ul style="list-style-type: none"> <li>• Headrick-Taylor, K., et al., (2019). Supporting Public-Facing Education for Youth: Spreading (Not Scaling) Ways to Learn Data Science With Mobile and Geospatial Technologies. <i>Contemporary Issues in Tech/Teacher Education</i>, 3(19)</li> <li>• Morrison, J. (Sept 19, 2019). Can We Turn Down the Temperature on Urban Heat Islands? <i>Yale Environment</i> 360</li> </ul> <p><b>Due: Presentation of science teaching technology</b>  <b>HW: Create Design Principles for Teaching Science for Equity</b></p>
13	April 21	<p style="text-align: center;"><b>Differentiating Instruction for Diverse Learners &amp; Student Learning Objectives</b></p> <p>We will: 1) review the culminating project for the course, 2) Explore how to design a unit, 3) Explore approaches to lesson plan design that reflect: your commitments, engaging students in inquiry/science practices, and differentiating instruction for diverse learners, 4) Explore how to write student learning objectives</p> <p><b>Assigned Readings to Be Completed <u>Before</u> this Class:</b></p> <ul style="list-style-type: none"> <li>• Universal Design for Learning (UDL) (<i>see Module Week 11 for link</i>)</li> <li>• Case Study 4: English Language Learners &amp; NGSS</li> <li>• Lesson 6: Writing Objectives: <a href="https://www.itma.vt.edu/courses/instrdes/lesson6.htm">https://www.itma.vt.edu/courses/instrdes/lesson6.htm</a></li> <li>• Chap 4: The Qualities of Useful Objectives (p.43-49). In Mager, R.F. (1997) <i>Preparing Instructional Objectives</i>, Third Edition</li> </ul> <p><b>Due: Design Principles: Annotated list of principles for teaching science for equity</b>  <b>HW: Create body of lesson</b></p>

14	April 28	<p style="text-align: center;"><b>Teaching Global Climate Change &amp; Teaching Practice</b></p> <p><b>Goal:</b> We will explore tools, resources, and approaches to teaching climate change. In addition, you will engage in teaching practice by designing and presenting a Body of a Lesson activity in class.</p> <p><b>Assigned Readings to Be Completed <u>Before</u> this Class:</b></p> <ul style="list-style-type: none"> <li>• Scientific Literacy &amp; Global Climate Change. STEM Teaching Tools #12 <a href="http://stemteachingtools.org/brief/12">http://stemteachingtools.org/brief/12</a></li> <li>• Explore climate change resources (see Module Week 13)</li> </ul> <p><b><i>Due: Body of lesson (in class presentation) /Teaching Practice</i></b></p>
15	May 5	<p style="text-align: center;"><b>Transformative Science Teaching &amp; Assessment</b></p> <p><b>Goal:</b> We will end the semester by exploring inspiring approaches to teaching and ways to cultivate a pedagogical vision and imagination to support your science teaching endeavors. In addition, we will explore different strategies for assessing student learning.</p> <p><b>Assigned Readings to Be Completed <u>Before</u> this Class:</b></p> <ul style="list-style-type: none"> <li>• hooks, bell. Teaching to Transgress: Education as the Practice of Freedom <ul style="list-style-type: none"> <li>1) Introduction (p.1-12)</li> <li>2) Chapter 1: Engaged Pedagogy (p.13-22)</li> <li>3) Chapter 3: Embracing Change (p. 35-44)</li> </ul> <p><i>[The whole book is great! Chap 2 is also highly recommended (but not required)]</i></p> </li> <li>• Assessment: <ul style="list-style-type: none"> <li>1) STEM Teaching Tools: Formative and summative assessment</li> <li>2) Practice Brief 16: The Informal Formative Assessment Cycle as a Model for Teacher Practice (<a href="http://stemteachingtools.org/brief/16">http://stemteachingtools.org/brief/16</a>)</li> </ul> </li> </ul> <p><b><i>Due: Unit plan draft</i></b> <b><i>Due: Lesson plan draft (optional)</i></b></p>
	May 19	<p><b><i>DUE: Final Portfolio</i></b> <b><i>IN CLASS Presentations: Overview of final project components</i></b></p>