San José State University
College of Science – Science Education Program
Course Number 40354, Secondary School Science, Section-01, Spring 2022

COURSE CONTACTS & INFORMATION

<table>
<thead>
<tr>
<th>Instructor</th>
<th>Dr. Tammie Visintainer</th>
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<tbody>
<tr>
<td>Office Location</td>
<td>Zoom (or Sweeney Hall 338)</td>
</tr>
<tr>
<td>Email</td>
<td><a href="mailto:tammie.visintainer@sjsu.edu">tammie.visintainer@sjsu.edu</a> (please use this email, not Canvas messaging)</td>
</tr>
<tr>
<td>Office Hours</td>
<td>By appointment</td>
</tr>
<tr>
<td>Class Days/Time</td>
<td>Tuesday 4:00PM – 10:00PM (8:00PM end virtual)</td>
</tr>
<tr>
<td>Classroom Location</td>
<td>Zoom/virtual</td>
</tr>
<tr>
<td>Prerequisites</td>
<td>CSET, one specialized area, secondary science education adviser approval</td>
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COURSE OVERVIEW

Course Description

This course centers equity, justice, and inclusion in science education. During the course, teacher candidates will engage with the methods, learning theories, and practices of teaching science in secondary schools that focus equally on science as a discipline and teaching students from racial/ethnic, linguistic, and socioeconomic backgrounds of great diversity. To do this, teachers will explore inquiry-based approaches to science teaching and how to engage students in the Next Generation Science Standards (NGSS). In addition, teacher candidates will learn how to design learning environments that leverage students’ diverse sense making practices as instructional resources and cultivate inclusive, learner-centered experiences. Teachers will leave the course with the tools to become justice-centered educators, prepared to teach science for equity and inclusion.

Course Goals and Vision

The goal of this course is to prepare teachers as reflective and responsive, designer and equity advocates who support students, especially those 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 contemporary issues of equity in science education?
- What types of instructional/pedagogical approaches promote teaching science for equity and inclusion?
- What is science inquiry and how does it relate to NGSS science practices?
- How do we support students as learners and doers of science through our instruction and pedagogy?
- How do we leverage students’ diverse experiences/sense making practices as instructional resources?
Course Learning Outcomes

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

- Create a 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 that is justice-centered and reflects current theories of learning.
- Learn how to engage students in authentic science practices and contemporary science phenomena.
- Design a unit and lesson plan that address California State/Next Generation Science Standards.
- Differentiate instruction and support students’ diverse ways of knowing, learning, and sense making.
- Create design principles that serve as actionable guidelines for your future instructional design.

Opportunities & Challenges of This Course

Becoming a science teacher is an exciting and noble endeavor! First and foremost, we are ALL science learners. Science is EVERYWHERE in our lives. Many of us learned science in schools in static, prescribed ways that made us think we were bad and science, lost us out of boredom, and/or didn’t peak our curiosity. Every day we wonder about things, ask questions, make observations – THIS is science 🌍. This course engages in what it means to teach in ways that address contemporary goals and issues in science education. You will develop a vision for teaching science and explore why teaching for equity is central to student learning and empowerment.

As exciting as this is, this course is also challenging. You will explore and teach science in ways you likely did not experienced in your own schooling. In addition, you will be asked to look inward and reflect on your own views and biases. While this may seem daunting, we will experience and practice strategies together in a critical caring community and support each other while engaging in science practices in authentic ways.

Creating a Critically Caring 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. It is important to create a safe and comfortable learning environment where we can explore, make mistakes, learn, and grow as professionals together. I have 2 main requests:

- Be open to new instructional and pedagogical approaches and ways of engaging with/doing science.
- Develop new ways of seeing students as young people, innovators, knowledge producers & learners.

Primary Teacher Performance Expectations (TPE’s) addressed in SCED 273

- 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)

Helpful Readings & Resources

- STEM Teaching Tools: Free resources – University of Washington: STEMTeachingTools.org
- National Science Teacher Association (NSTA): TONS of resources, free, even more with membership
Connection to Lurie College of Education

COURSE EXPECTATIONS

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

- **Participation**: The course is designed as a practicum, thus, active participation is essential (even virtually) 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, 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.

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

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: Written assignments are due on Tuesday BEFORE the start of class.

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.
DETERMINATION OF GRADES

- **Participation & Class Assignments = 60% of Final Grade**
  - Demonstration of teaching practices – 15
  - Course participation – 15
  - Course assignments – 30

- **Final Project: Teaching Portfolio = 40% of Final Grade**
  - Lesson plans (2 total) – 10
  - Unit Plan – 10
  - Teaching Statement & Philosophy of Equity (Final Version) – 10
  - Design Principles for Equity (Final Version) - 10

**Additional Grading Information:** The lesson and unit plans 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 attendance can be found in these 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.

<table>
<thead>
<tr>
<th>% of Points</th>
<th>Grade</th>
<th>Reported Student Achievement</th>
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<tbody>
<tr>
<td>97-100%</td>
<td>A+</td>
<td>Exceeds Teaching Performance Expectations (TPE)</td>
</tr>
<tr>
<td>94-96%</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>90-93%</td>
<td>A-</td>
<td></td>
</tr>
<tr>
<td>87-89%</td>
<td>B+</td>
<td></td>
</tr>
<tr>
<td>84-86%</td>
<td>B</td>
<td>Meets Teaching Performance Expectations</td>
</tr>
<tr>
<td>70-83%</td>
<td>C-</td>
<td>Minimally meets Teaching Performance Expectations</td>
</tr>
<tr>
<td>67-69%</td>
<td>D+</td>
<td>Provides little evidence for meeting (TPE)</td>
</tr>
<tr>
<td>64-66%</td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>60-63%</td>
<td>D-</td>
<td></td>
</tr>
<tr>
<td>Below 60%</td>
<td>F</td>
<td>Does not meet (TPE)</td>
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**Important Note**
- 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 273.

**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 OVERVIEW

Weekly 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 responding to the prompts.
- Responses to the on-line discussion are due on MONDAY NIGHT by midnight.

Weekly Science Journal (not graded): A central aspect of growing as an educator is inquiring into your own practice and cultivating networks and resources that support your endeavors. Throughout the course you are encouraged to keep a science journal as a way to create a collection of resources and approaches for your teaching practice. During weekly “warm up” and lesson activities you are encouraged to record the different pedagogical moves and instructional approaches you experienced that you can apply to your own practice. Engaging in this practice serves as a model that you may choose to use with your own students.

Educational Autobiography: Prepare a short (~2 pages) statement about who you are – as a student, science person, and prospective science teacher with particular emphasis on formative science experiences in/outside of K-12 schooling and college. The details you include are entirely up to you. The purpose is for me, you, and your classmates to get to know each other. NOTE: The instructor will read these and you will share them in class.

Teaching Statement & Philosophy of Equity: 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 portfolio for the course.

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 & Inclusion: Based on insights gained from course readings, you will create an annotated list of principles that serve as guidelines for the design of equitable science learning environments. The design principles provide an opportunity for you to synthesize readings and experiences from the course into actionable guidelines. The goal is to put big ideas and theories into practice.

Lesson Plans: A key element of this course is for you to learn how to design lesson plans involving science phenomena that engage students in NGSS/inquiry. You will use the lesson plan template for the course to guide your design. Details and components of the lesson plan will be described during review of the lesson plan template. We will build and practice components of the lesson plan throughout the summer course.

Unit Plan: As part of your final project you will be asked to create a unit plan overview and outlines that includes your detailed lesson plan. You will use the unit plan template provided that includes a description of the goals of the unit including how you plan to incorporate inquiry and equity throughout the unit.
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 section at http://info.sjsu.edu/static/catalog/policies.html. Add/drop deadlines can be found on the current academic calendar web page: http://www.sjsu.edu/provost/Academic_Calendars/

The Late Drop 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 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 at http://www.sjsu.edu/gup/syllabusinfo/

COURSE OUTLINE

The 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. The syllabus will be regularly updated/posted on Canvas to reflect the current topics. Note: All readings are available through Canvas.

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>THEMES &amp; GOALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Feb 1</td>
<td>Introduction to Science Teaching &amp; Learning</td>
</tr>
<tr>
<td></td>
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<td><strong>Goal:</strong> 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.</td>
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<tr>
<td>2</td>
<td>Feb 8</td>
<td>Issues of Equity in Science Education: Challenges &amp; Opportunities</td>
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<tr>
<td></td>
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<td><strong>Goal:</strong> 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.</td>
</tr>
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**Assigned Readings to Be Completed Before this Class:**
### Optional Reading:

### Assignment Due: Educational Autobiography

#### 3 Feb 15

**Developing a Vision: Empowering Students as Learners & Doers of Science**

**Goal:** We will explore connections between an instructor’s vision the design of instructional/pedagogical resources, and shifts that occurred for youth through while they engaged in community-based scientific research.

**Assigned Readings to Be Completed Before this Class:**

#### 4 Feb 22

**Theories of Learning: Science, Culture & Inquiry**

**Goal:** We will explore how students learn and understand science. In addition, we will engage an inquiry activity with varying levels of scaffolding in order to experience different instructional approaches to inquiry as learners.

**Assigned Readings to Be Completed Before this Class:**

**Assignment Due: Draft of Teaching Statement and Philosophy**

#### 5 March 1

**Overview: Next Generation Science Standards**

**Goal:** 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.
### Assigned Readings to Be Completed Before this Class:
- NSTA Transitioning from Scientific Inquiry to 3D Teaching and Learning.
- Practice Brief 31: How to Launch STEM Investigations That Build on Student/Community Expertise ([http://stemteachingtools.org/brief/31](http://stemteachingtools.org/brief/31))

### Assignment Due: Science-Self Documentation Project

<table>
<thead>
<tr>
<th>6</th>
<th>March 8</th>
<th>NGSS Part 2: Science &amp; Engineering Practices</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Goal:</strong></td>
<td>We will explore the NGSS science and engineering practices, and practice designing an elicit and engage activity for an opening to an NGSS lesson.</td>
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</tbody>
</table>

### Assigned Readings to Be Completed Before this Class:
  - Chapter 3: Scientific & Engineering Practices in a Framework for K-12 Science Education: (p.41-82)

### Assignment Due: NGSS DCI & PE Table for your discipline

<table>
<thead>
<tr>
<th>7</th>
<th>March 15</th>
<th>Teaching Science for Equity Part 1: Race, Identity, Learning &amp; Scientific Literacy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Goal:</strong></td>
<td>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.</td>
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### Assigned Readings to Be Completed Before this Class:
<table>
<thead>
<tr>
<th>Date</th>
<th>March 22</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Teaching Science for Equity Part 2:</strong></td>
<td></td>
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<tr>
<td><strong>Equitable Approaches to Science Instruction</strong></td>
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<tr>
<td><strong>Goal:</strong> 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.</td>
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<tr>
<td><strong>Assigned Readings to Be Completed Before this Class:</strong></td>
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<thead>
<tr>
<th>Date</th>
<th>March 29</th>
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<tr>
<td><strong>NO CLASS SPRING BREAK</strong></td>
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<tr>
<th>Date</th>
<th>April 5</th>
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<tbody>
<tr>
<td><strong>NGSS SEPs, Learning Objectives, &amp; Lesson Design Practice</strong></td>
<td></td>
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<tr>
<td><strong>Goal:</strong> We will explore the components of effective learning objectives and practice designing learning experiences that promote equity and inclusion by engaging students in science practices</td>
<td></td>
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<tr>
<td>• Lesson 6: Writing Objectives:</td>
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<tr>
<td><a href="https://www.itma.vt.edu/courses/instrdes/lesson6.htm">https://www.itma.vt.edu/courses/instrdes/lesson6.htm</a></td>
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<tr>
<td>• NPR Code Switch, Race Underneath the Skin (LISTEN)</td>
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<tr>
<td>ahttps://www.npr.org/2018/12/26/679287399/race-underneath-the-skin</td>
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<thead>
<tr>
<th>Date</th>
<th>April 12</th>
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</thead>
<tbody>
<tr>
<td><strong>Differentiating Instruction for Diverse Learners</strong></td>
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<tr>
<td><strong>Goal:</strong> We will explore how to differentiate instruction and the components of universal design for learning (UDL).</td>
<td></td>
</tr>
<tr>
<td><strong>Assigned Readings to Be Completed Before this Class:</strong></td>
<td></td>
</tr>
<tr>
<td>• Rosebery, Warren, Ballenger, C. (2008) In: <em>Teaching Science to English Language Learners</em></td>
<td></td>
</tr>
<tr>
<td>• Introduction, Chap 1: Creating a Foundation Student Conversation</td>
<td></td>
</tr>
<tr>
<td>• Case Study 4: English Language Learners &amp; NGSS</td>
<td></td>
</tr>
<tr>
<td>• Universal Design for Learning (UDL)</td>
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</tbody>
</table>

**HW:** *Scientific literacy: Position statement*
### April 19

**Scientific Literacy**

**Goal:** We will explore the concept of scientific literacy and its importance for engaging fully and democratically in an information and data-rich society.

**Assigned Readings to Be Completed Before this Class:**
- Case Studies: Fact Checking in an Era of Fake News
- Civic Online Reasoning, Stanford History Education Group (https://cor.stanford.edu/) (Explore Website)

**Due:** Position statement  
**HW:** Research learning technology + body of lesson activity

### April 26

**Technology in the Science Classroom**

We will explore different types of learning technologies that can be used in science teaching (e.g., simulations, real-time data, models etc). You will research and present a technology of your choosing to the class.

**Assigned Readings to Be Completed Before this Class:**

**Due:** Present Technology/Body of Lesson  
**HW:** Design principles for teaching science for equity - DRAFT  
**HW:** Unit plan – DRAFT (OPTIONAL)

### May 3

**Place-Based & Community-Based Science**

**Goal:** 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.

**Assigned Readings to Be Completed Before this Class:**
- Scientific Literacy & Global Climate Change. STEM Teaching Tools #12 http://stemteachingtools.org/brief/12
- Morrison, J. (Sept 19, 2019). Can We Turn Down the Temperature on Urban Heat Islands? *Yale Environment 360*
### Transformative Science Teaching & Assessment

**Goal:** 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.

**Assigned Readings to Be Completed Before this Class:**
- hooks, bell. Teaching to Transgress: Education as the Practice of Freedom
  1) Introduction (p.1-12)
  2) Chapter 1: Engaged Pedagogy (p.13-22)
  3) Chapter 3: Embracing Change (p. 35-44)
  *(The whole book is great! Chap 2 is also highly recommended (but not required))*

<table>
<thead>
<tr>
<th>15</th>
<th>May 10</th>
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</tr>
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</table>
|  |  | **Due: Design Principles (DRAFT)**  
**OPTIONAL: Unit plan (DRAFT)** |  |
|  |  |  |  |
| **May 24 (or May 17 if preferred)** | **DUE: Final Portfolio**  
**CLASS Presentations:** Present overview of your final portfolio |  |  |