

**EDUC 267 b Fall C&I  
The Art & Joy of Lesson Planning**

**COURSE INFORMATION**

**Curriculum and Instruction in Science Education**

Tuesdays

CERAS 300

Course Website: <http://canvas.stanford.edu>

3:15pm- 6:05pm

**INSTRUCTOR INFORMATION**

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**COURSE GOALS**

This course will focus on preparing pre-service teachers to plan learning segments and curricular units to be used for science teaching. The course is designed to achieve the following goals:

- To prepare all students to design learning segments based on their understanding of students' skills, backgrounds and needs,
- To prepare all pre-service teachers to design lesson plans, learning segments, and curricular units that create deeply integrated learning segments that enable students to understand and apply their conceptual understanding, and
- To prepare all students to analyze and assess the impact of their planning strategies on student learning in an effort to revise and improve their instructional performance.

**COURSE OVERVIEW**

The process of teaching is more complicated than it may appear. Very few of the intricate details of teaching are visible to the common observer. Teachers make hundreds of decisions everyday. As a science teacher you will develop a theoretical framework for effective science teaching and learn how to translate that framework into instructional decisions. The summer quarter of C&I series placed an emphasis on planning for instruction. This quarter will focus on creating learning segments especially designed for your students. During this quarter, we will work between theory and practice, and between individual aspects of teaching and the whole group learning.

In this way, the fall quarter differs from traditional science courses where you “finish” a topic and move on. During this quarter, you will explore the iterative process that is teaching and learning. We will focus on the iterative process of teaching by planning learning segments and

revising them as we come to understand their effectiveness. We will also learn new concepts and revisit them as we come across alternative understandings. In this sense, our planning and learning will involve constant revision and reflection on new concepts and instructional strategies. This approach is designed to model the instructional cycle that includes *Planning, Teaching, Analyzing, Adjusting, and Reevaluating*.

Using this cyclical instructional approach will enable us to truly integrate our learning experiences with the experiences we are gaining as interns. Our weekly working sessions will enable us to build a strong connection between our practical and theoretical education. To highlight this process we have implemented four themes for our course:

**Theme #1:**            *Teaching as Cycles*

Teaching is a nested set of teaching cycles where you plan, teach and assess, analyze, and adjust, and plan again.

**Theme #2:**            *The Planning Junction*

Decisions about teaching require an interrelated knowledge of students, subject matter, and logistics.

**Theme #3:**            *Meaningful Participation*

Successful science teaching requires the development of a classroom culture that promotes participation in meaningful ways.

**Theme #4:**            *Iterative Science Instruction*

Science is an iterative process of observing/taking data, finding patterns in the observations, and explaining the patterns (*see the theme diagrams below*).

Reviewing these themes suggests that successful teaching requires development of a balance of knowing **what** to teach, knowing **how** to teach, and knowing **how to assess** students' learning. In order to accomplish this, teachers must develop a dynamic understanding of classroom learning that integrates knowing the subject matter, skillfully using assessment, and creating productive learning communities.

*Knowing subject matters and how to teach them*

We review this issue of identifying what big ideas of science you will choose to teach and how you can have students apply these ideas. In doing this you may find yourselves reorganizing your own understanding of science so that it is more useful for you as a teacher. Then we will consider how to teach. You will have many opportunities to work through teaching cycles where you plan,

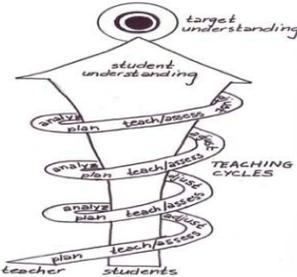
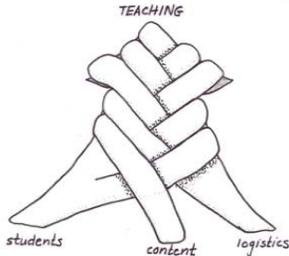
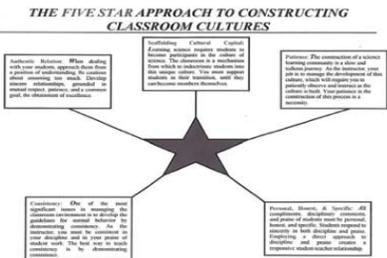
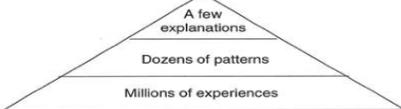
teach and assess, then reflect and adjust your teaching. In this course our semester will be centered on planning a single unit.

### Assessing and working with students

Through your field experience, you will have opportunities to work with many students, many of whom will be different from the student that you were. You will learn how to assess students' understanding every time you teach and how to plan lessons taking into account how and what students are learning. You will have to observe individual students and gain insight about their understanding of science and what their social issues are.

### Creating and managing a learning community

We will work on understanding what makes individual students tick and identify routines and policies that support a well-managed classroom. Management and motivation will be issues that we address every time we consider a new teaching technique. We will identify how many aspects of teaching affect management and the quality of a classroom learning community.

 <p><b>Teaching is a nested set of teaching cycles where you plan, teach and assess, analyze and adjust, and plan again.</b> This approach requires more work than copycat teaching or teaching without planning, but it will enable you to learn from and adapt to any situation you encounter during your teaching career.</p>	 <p><b>Decisions about teaching require knowledge of students, subject matter, and logistics.</b> In your field and lab experiences, all three aspects are at play all of the time and you will learn how to look for each aspect. In class we will work on these aspects separately before you learn to weave them together.</p>
<p><b>THE FIVE STAR APPROACH TO CONSTRUCTING CLASSROOM CULTURES</b></p>  <p><b>Successful science teaching requires the development of a classroom culture that promotes participation in meaningful ways.</b> The challenge of managing students' behavior, while nurturing a rich communicative environment becomes an important component of your instructional objectives. This complicated task requires a</p>	<p><b>Science Curriculum as Experiences, Patterns, and Explanations</b></p>  <p>Experiences (transformed into data) include personal experiences, laboratory or field experiences, and vicarious experiences conveyed through pictures, videos, data sets on Internet, etc. Patterns include laws, generalizations, categories, etc. Explanations include a few coherent, parsimonious theories and models based on those theories</p> <p>Charles W. Anderson</p> <p><b>Science is an iterative process of observing/taking data, finding patterns in the observations, and explaining the patterns.</b> We need to teach all of the scientific process.</p>

*\*\*Special Thanks to Dr. Joyce Parker & Dr. Any Anderson for the above images*

### **‘Doing’ towards understanding**

In addition to our emphasis on these basic themes of teaching, we will organize this course around three basic tasks. First, you will continue to collect and use multiple sources of information to pre-assess students in an order to design an effective student-learning environment. To do this you will complete a detailed analysis of your students that includes video-based analyses of students’ engagement and students’ learning.

Second, you will demonstrate your understanding of how to design learning segments by creating a detailed lesson plan for a single lesson plan. This lesson plan will be designed to reflect your students’ interest, prior knowledge, and skills.

Third, you will design a complete unit plan that provides a detailed plan for an extended series of lesson plans. This unit plan will provide a detailed map of how to plan to engage students in fruitful learning activities that extend over several days of instruction. There are 7 assignments this quarter:

#### **ASSIGNMENTS CALENDAR**

<b>#</b>	<b>DESCRIPTION</b>	<b>Class Date</b>	<b>Due Date</b>
<b>1</b>	NONE	<b>9/27</b>	n/a
<b>2</b>	60 Minute Learning Segment Design: Accountability & Doing	<b>10/4</b>	2:00pm 10/4
<b>3</b>	90 Minute Learning Segment Design	<b>10/11</b>	2:00pm 10/11
<b>4</b>	Cognitive Apprenticeship Lesson Planning Outline	<b>10/18</b>	2:00pm 10/18
<b>5</b>	Full Cognitive Apprenticeship Full Lesson Plan	<b>10/25</b>	2:00pm 10/25
<b>6</b>	Learning News Letter	<b>11/1</b>	2:00pm 11/1
<b>7</b>	NONE	<b>11/8</b>	2:00pm 11/8
<b>8</b>	Full Cognitive Apprenticeship Lesson Plan Conversion	<b>11/15</b>	2:00pm 11/15
	None	<b>None</b>	n/a

9	None	11/29	n/a
10	Social Justice/ CRP Lesson Plan with Curriculum Materials ( <i>Slides, Handouts, Lab</i> )	12/6	2:00pm 16/6

**Assignment #1: 60- Minute Learning Segment Design: Accountability & Doing**

The structure of your daily plans have a huge impact on students’ experiences and learning. On the high end, teachers hope to make every lesson effective and engaging. At the bare minimum, each lesson should be effective. Your assignment is to design a 60-minute agenda for learning. In your agenda, you will structure your learning segments to accomplish two things: (1) students are accountable to share that they are learning with other students, and (2) students are ‘doing’ something to learn about a concept. By ‘doing’, it is to suggest that students are not being told about the concept but are engaged in a learning verb that produces understanding. The completed assignment will be uploaded to Canvas. Use the template provided on canvas with a time, task, description, and needs columns of a table.

**Assignment #2 90 Minute Learning Segment Design**

Schools are designed in different ways; some prefer the 60 minute lesson time while others use 90-minute learning segments. Your task is to design a learning segment that includes learning segments that allow students to experience the following when learning about a phenomena: (1) See it- students will watch a video or simulation of the concept, (2) Do it – students will engage in a hands-on learning segment to understand the concept, (3) Explain it – every students will have and opportunity to explain what they are learning in a learning segment, (4) Read it – students will read about the concept to confirm what they are learning. Your agenda will include each of these learning segments in a single 90-minute window. The completed assignment will be uploaded to Canvas. Use the template provided on canvas with a time, task, description, and needs columns of a table.

**Assignment #3: Cognitive Apprenticeship Lesson Planning Outline**

Our basic approach to science teaching is rooted in the cognitive apprenticeship approach to lesson planning. In this approach, you will think through a concept that allows your students to “Acquire” science knowledge in pursuit of understanding and solving a scientific problem. This assignment is a pre-planning activity where you outline a future lesson. For this task, you will select a concept and draft the following:

**a) Establish a Problem – Learning Segment**

Think critically about the concept you would like to teach. Identify a context that would require the students to learn this concept. Create a learning segment that will allow the

students to discuss or become aware of the problem that requires them to learn this concept.

**b) Modeling Learning Segment**

The first components of your lesson are teacher centered. They are designed to help the students learn the basics of the concept with the teacher's support. These tasks will be heavily scaffolded by the teacher. Describe this modeling segment.

**c) Coaching Learning Segment**

The second component of your lesson will see you switch your role from teacher centered to student centered. These learning segments are intended to allow the students to do things in order to understand the concepts and the contexts. Describe what you might do for these tasks.

**d) Fading Learning Segment**

The final types of learning segments for your lesson will be fading activities. You will design learning tasks that allow the students to explain what they are learning in the meaningful context you selected.

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**Assignment #4: Cognitive Apprenticeship Lesson Planning – Full Lesson**

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Assignment 4 will see you translate your work from assignment #4 into a full lesson plan. For this you will write a single learning plan. This plan will include a detailed description of the plan for students' learning that will include three primary sections. You will have a section that focuses on identifying a. what students will come to understand, b. a section focusing on what students will do to gain that understanding, c. a section describing how you will assess how they are progressing, and d. a detailed agenda and pacing guide. We will use a lesson planning template that is available on canvas. The following components must be present in each lesson plan:

**(1) Learning Goals**

- a. A Reference to the NGSS Standard you are teaching
- b. A list of learning goals
- c. A list of content and support vocabulary

**(2) Learning Activities**

**(3) A List of Resource Needed**

**(4) A detailed agenda of learning tasks**

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**Assignment #5: Learning Newsletter**

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This series of articles explores a series of research discussing some basic principles about how students come to know. These learning articles provide a list of principles about how students come

to understand phenomenon. In connection with the ideas associated with Metacognition, you will generate a newsletter that is to be distributed to the students you will be teaching next year. You will create a 1–2-page newsletter that explains some basic ideas about how they learn. This document will use references from the articles we read, explanations of key learning concepts, and descriptions of the knowledge derived from reading the articles. This will offer your students a simple introduction to how learning happens in your classroom. To provide them a sense of structure, your newsletter **must also explain** how what you have students do in class is connected to these theories of learning.

### **Assignment #6: Full Cognitive Apprenticeship Conversion**

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A component of teaching involves using existing lesson plans and turn them into the type of lesson plans you want to use in your classroom. Your task is to convert an existing lesson plan into Cognitive Apprenticeship Lesson Plan. Your lesson plan will need to have 4 types of activities: (1) Establishing A Problem – Create an activity that introduces the concept in a context that makes the content necessary, (2) Modeling- Create a set of activities that are teacher-centered. These activities are intended to introduce the students to the big ideas of the unit with the teacher's assistance., (3) Coaching- These are student-centered learning segments that allow the students to explain, analyze, and explore the concepts together., (4) Fading – The final aspect of the activities will be learning segments that allow students opportunities to explain the ideas towards mastery. Use the course lesson planning template to list your activities, writing learning goals, and to create a timed instructional agenda.

### **Assignment #7: Social Justice/ CRP Lesson Plan with Curriculum Materials (Slides, Handouts, Lab)**

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Students are always trying to understand the challenges of their world. Social Justice teaching provides students an opportunity to use the science they are learning to address the social issues impacting their local community. For this final assignment, you will create a cognitive apprenticeship lesson plan with a focus on social justice. To do this, make the following alterations to your lesson planning:

**(1) Social Justice Essential Question**

Create an essential question for this lesson that requires the students to learn a science concept in an effort to discuss or analyze a larger science phenomenon.

**(2) Social Justice Formative Assessment**

During your lesson plan, make sure there are opportunities for students to talk about the concepts in the context of the social issues. They should explain the science in the context of the issues.

**(3) Social Justice Performance Based Assessment**

The final assignment for this lesson will ask students to explain the phenomenon and its social meaning to a new authentic audience. They will explain concepts and their social meaning to an audience that matters to the students.

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**10/11 READINGS FOR SESSION 2: Grading**

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Feldman, J. (2019) Chapter 1. What makes grading so difficult to talk about and ever harder to change? *Grading for Equity: What it is, Why it Matters, & How it Can Transform Schools and Classrooms*. New York, NY: Sage Publishers

Feldman, J. (2019) Chapter 3. How traditional grading stifles risk-taking and supports the commodity of grading. *Grading for Equity: What it is, Why it Matters, & How it Can Transform Schools and Classrooms*. New York, NY: Sage Publishers

**10/18 READINGS FOR SESSION 3: Learning**

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Bransford, J. (2000) How People Learn (Chp 3.) *Learning & Transfer*. Washington, DC: National Academies Press.

Brown, J.; Collins, A.; & Duguid, P. (1989) Situated Cognition and the culture of learning. *Educational Researchers*, 18, 32-41.

**10/25: The Life of a Teacher**

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Cleeves, J. (2022) Chapter 2: Burnout vs. Demoralization vs. Exploitation. *Planning to Stay: Burnout, Demoralization, and How to Reclaim Your Classroom Life Anyway*. Inspirebytes Omni Media. Wilmette, IL