SCHOOL OF EDUCATION AND COUNSELING PSYCHOLOGY

Department of Education
MATTC Program
EDUC 288A(3 units)
Secondary Science Methods
Fall 2023

Professor: Dr. Won Jung Kim (wkim2@scu.edu)
Course Meeting: Tue. 5-8 PM
Classroom: Guadalupe Hall, 206, or Zoom
Office Hours: Tue. 2:30-4:30 pm, 8-9pm, via Zoom or In-person

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Land Acknowledgment

We acknowledge that Santa Clara University sits on the land of the Ohlone and Muwekma Ohlone people. We remember their continued connection to this region and give thanks to them for allowing us to live, work, learn, and pray in their traditional homeland. We offer our respect to their Elders and to all Ohlone people of the past and present.

Mission and Goals

Mission and Goals of the Department of Education

Rooted in the Jesuit tradition at Santa Clara University, the mission of the Department of Education is to prepare professionals of competence, conscience, and compassion who will promote the common good as they transform lives, schools, and communities. Our core values of reflective practice, scholarship, diversity, ethical conduct, social justice, and collaboration guide both theory and practice. Faculty, staff, and students in the Department of Education:

1. Make student learning our central focus
2. Engage continuously in reflective and scholarly practice
3. Value diversity
4. Become leaders who model ethical conduct and a commitment to social justice
5. Seek collaboration with others in reaching these goals

MS/SS Teaching Credential Program Learning Goals (PLGs)

The PLGs represent our commitment to individuals who earn their MS/SS credential at Santa Clara University. The MS/SS faculty focus on ensuring each student will begin their teaching career ready to:

1. Maximize learning for every student.
2. Teach for student understanding.
3. Make evidence-based instructional decisions informed by student assessment data.
4. Improve your practice through critical reflection and collaboration.
5. Create productive, supportive learning environments.
6. Apply ethical principles to your professional decision-making

The PLGs guide our program. Therefore, all MS/SS teaching credential program course objectives are cross-referenced with the PLGs. (A fully elaborated version of the MS/SS PLGs can be found in the Teacher Candidate Handbook, Pre-Service Pathway.)

Course Description

This course introduces instructional design strategies and underling pedagogical rationales for secondary science teaching. In addition, the course is designed for engagement with current issues, challenges, and opportunities associated with science teaching and learning at the secondary level, with particular emphasis on the assurance that all students have opportunities to learn the core ideas, practices, and crosscutting concepts (as outlined in state and national standards documents), while leveraging students' interests, prior knowledge, and lived experiences.

Here, I use the term *all students* in coherence with the inclusive definition of California Teacher Performance Assessment Guides: as students

- who may exhibit a wide range of learning and behavioral characteristics, as well as disabilities, dyslexia, intellectual or academic advancement, and differences based on ethnicity, race, socioeconomic status, gender, gender identity, sexual orientation, culture, language, religion, and/or geographic origin, and
- whose first language is English, English learners, and Standard English learners.

This course is grounded in three frameworks for what to learn to teach science:

- who students are in science learning spaces: exploring what it means for students to exercise rightful presence as legitimate constructors and critics of science knowledge and practices, paying particular attention to rightful presence of students with exceptionalities in LRE;
- how teachers can support students' science learning: exploring 5-E instructional model to pedagogically support students' sense-making and critical use of science knowledge and practices;
- what counts as science that matters and that students want/need to learn and do: exploring three-dimensional learning aligned to the *Next Generation Science Standards*; particularly with regard to 'science that matters', we explore how to integrate environmental justice issues and sustainability goals into instructional designs and student learning.

We engage in the discussions and activities about these frameworks. I hope these frameworks help you establish your own pedagogies through working on the three main assignments of the course as introduced on the following page. The assignments are also designed for you to work on your TPA and ultimately get ready for your long-term career as a secondary science teacher.

Course Objectives

This course will create opportunities to develop pre-service teachers' knowledge of…	*Standard/Goals Addressed*			
	DG #	***PLG #***	***TPE #***	***MMSN***
scope and sequences of science, health, and physical education based on state and national standards, focusing on a balanced approach that addresses all aspects of scientific/health/PE conceptual development at the elementary level.	1	1, 2	1.1, 3.2	1.1, 1.2, 2.1,2.10 4.2, 4.4, 4.5, 5.6
skills and disposition necessary to make instructional decisions (e.g., task selection and adaptation, opportunities for collaborative learning and scientific inquiry, differentiation) that promote a positive climate for learning and meet the instructional needs of diverse learners (e.g., English Learners, students with special needs), by leveraging students' interests, prior knowledge, and lived experiences.	1, 3, 4	1, 2, 5, 6	1.3, 2.5, 3.2, 4.4	1.2, 1.7, 2.1, 2.10, 4.2, 4.5, 5.6
student progress toward content standards by using instructional strategies that assess student learning throughout the learning process	1, 2	3, 4	1.8, 4.4, 5.2, 5.3	2.1, 2.10, 4.5
planning, teaching, and reflecting upon lessons in respective content areas, which are built around models of how people learn to create short and long-term goals that are responsive to the unique needs of the student and meet the grade level requirements of the core curriculum, and which are systematically adjusted to promote maximum learning and academic achievement within inclusive environments.	1, 2	1, 2, 4	1.5, 3.3, 4.4, 4.7,6.1	1.1, 4.3, 4.4, 4.5
Engagement with peers, master teachers, and the larger professional community of science practitioners and researchers to construct and maintain a learning environment committed to three-dimensional science learning and social justice.	4, 5	4, 5	3.6	2.1, 2.10, 4.3, 4.4, 4.5
	***DG**=Department Goals; **PLG**=Program Learning Goal; **TPE**=Teaching Performance Expectation Standard			

Resources

All readings are available online (linked), and/or as PDF files on our Google Class Folder.
See Appendix C for additional resources.

Required texts (Before-class tasks)

- Science Instruction: What to Consider?
- National Research Council [NRC]. 2012. A Framework for K-12 Science Education. Practices, Crosscutting Concepts, and Core Ideas
- 5E Summary.pdf
- Michaels, S., & O'Connor, C. (2012). Talk science primer. *Cambridge, MA: TERC*.
- What is carbon capture, usage and storage (CCUS) and what role can it play in tackling climate change? (Serin, 2023)
- Podcast: Plastic Recycling Doesn't Work and Will Never Work (Judith Enck, 2022)

Choice readings (session 6)

- Braaten et al. (2022). How do race and racism connect with science learning in early childhood and elementary classrooms?
- Long et al. (2019). How do we present gender, sex, and sexuality as part of inclusive and accurate science teaching?
- Penuel et al. (2021). How can you advance equity and justice through science teaching?
- Tesoriero et al. (2019). Creating science learning experiences that support learners receiving special education services
- Wingert (2016). How to design assessment for Emerging Bilingual students

Class activity references

- ECJ unit plan examples
- Council of State Science Supervisors: Safety guides
- Working Together: Science Teachers and Students with Disabilities
- Teaching Tools for (STEM) Education
- NRC. 2014. Developing Assessments for the Next Generation Science Standards
- Christie-Blick. (2021). Climate Justice: Science for a Better World. The Science Teacher, 89(2).
- Chowning & Peterman (2015). Beyond the Written C-E-R: Supporting Classroom Argumentative Talk about Investigations
- Elmi et al. (2022). Let's talk climate
- Guevara et al. (2021). Using Local Phenomena to Communicate Climate Solutions
- Krauskopf, S. (2021). Considering the Value of Indigenous Knowledge and Practices. The Science Teacher, 89(1).

Recommended texts

- Long, S., Steller, L., & Suh, R. (2021). Gender-Inclusive Biology: A framework in action. The Science Teacher, 89(1).
- Hunter-Thomson, K. (2021). How Can We Use and Interact with Graphs Better? (Data Literacy 101) Breadcrumb. Science Scope, 44(6).
- Manz (2019). Designing 'productive uncertainty' into investigations to support meaningful engagement in science practices
- Odom, A. L., & Bell, C. V. (2021). Shaking out Probability. Science Scope, 44(5).

- Ruskey et al. (2021). Keeping Climate Science Learning and Instruction Focused on Creating Solutions and Building Community Resilience
- Shouse & Lakhani (2014). Failing Forward: Managing Student Frustration During Engineering Design Projects
- Van Horne & Bell (2014). Why should students investigate contemporary science topics—and not just "settled" science?
- William & Gray (2021). Wholistic Science Pedagogy. The Science Teacher, 89(1).
- Weaver et al. (2019). Students should generate criteria and constraints for engineering design problems—not just be provided with them
- Allchin, D. (2020). From Nature of Science to Social Justice: The Political Power of Epistemic Lessons. In *Nature of Science for Social Justice* (pp. 23-39). Springer, Cham. DOI: 10.1007/978-3-030-47260-3_2
- Mutegi, Jomo W., Demetrice Smith-Mutegi, and Nicole Lewis. "Fostering Critical Perspectives of Science among Preservice Elementary Teachers: An Empirical Identification of Affordances and Hindrances." *Journal of Science Teacher Education* (2022): 1-22.

Assignments Overview

(Assignment details will be introduced around the respective sessions).

Session	Assignment: During/After-class tasks	Platform	Pts (100)
1 (9/19)	**1-1**. Course-opening survey **1-2**. Course Start Quiz	form Camino	5 5
2 (9/26)	**2.** Connecting ECJ to NGSS Disciplinary Core Ideas	Class slide	5
3 (10/3)	**3**. 5E-based, NGSS-informed, ECJ-integrated science unit brainstorming	Class slide	10
4 (10/10)	**4.** Learning goal setting	Class slide	5
5 (10/17)	**5.** CER talk activity design	Class slide	5
6 (10/24)	**6.** Learning from your students	Class slide	5
7 (10/31)	**7.** Action-oriented activity design	Class slide	5
8 (11/7)	**8.** Assessment design	Class slide	5
9 (11/14)	**9.** Review Quiz	Camino	15
10 (11/21)	**10-1.** Course-ending survey **10-2.** Final lesson plan	form Camino	5 30

Course Calendar

The course calendar details are subject to change.

Session	Before: Read	During: Act	After: Expand
1 (9/19)	Science Instruction: What to Consider?	**Intro to the course: Science that matters** - Syllabus and Assignments - Signature assignment: Science Lesson Design for Environmental Consciousness toward Justice (ECJ) o Why ECJ in Science? o What does it look like?	**1-1**. Course-opening survey **1-2.** Course Start Quiz

2
(9/26)
	NRC (2012) (pp. 29-53)	**NGSS: Science Standards**
		- Assignment Share-out
		- Opening Activity
		  o Phenomena Spotlight
		  o Classroom Scenarios
		- NGSS standards
		- Integrating ECJ into NGSS-informed science instruction
		  o NGSS: Science & Engineering Practices
		  o NGSS: Crosscutting Concepts
			2. Connecting ECJ to NGSS Disciplinary Core Ideas

3
(10/3)
	5E Summary.pdf	**5E instructional model**
		- Assignment Share-out
		- Opening Activity
		  o Phenomena Spotlight
		  o Classroom Scenarios
		- Why 5E (Engage, Explore, Explain, Elaborate, Evaluate) for Science Instruction?
		  o Watch a teacher video and analyze
		  o Analyze the video in terms of 5E, NGSS, and ECJ
		  o Gas properties simulation
		  o Carbon capture, usage, and storage
			3. 5E-structured, NGSS-informed, ECJ-integrated science unit brainstorming

4 **(10/10)**	Please review what we learned from previous sessions	**Science Lesson Backward Design** - SMART Learning goals**:** Revisit your assignment 3 & refine learning goal statements - SCU tUrn Project Participation	**4.** Learning goal setting

5
(10/17)
	Michaels & O'Connor (2012)	**Science Talk**
		- Assignment Share-out
		- Opening Activity
		  o Phenomena Spotlight
		  o Classroom Scenarios
		- Science talk moves & CER
		  o Science talk moves
		  o Claim-Evidence-Reasoning for Inquiry Practice
			5. CER talk activity design

6
(10/24)
	Choice reading for Jigsaw	**Rightfully present science learners**
		- Assignment Share-out
		- Opening Activity
		  o Phenomena Spotlight
		  o Classroom Scenarios
		- Peer teaching: choice reading for jigsaw
		  o learners with exceptionalities: science learning in Least restrictive environment
		- Ask questions to understand your students
			6. Learning from your students

7 **(10/31)**	Listen to this podcast: Plastic Recycling	**Science learning as action** - Assignment Share-out - Opening Activity	**7.** Action-oriented activity design

	Doesn't Work and Will Never Work (Judith Enck, 2022)	o Phenomena Spotlight o Classroom Scenarios - ECJ science education: affordance & hindrances o Myth of ECJ education void of action - Make your ECJ science lesson action-oriented	
8 (11/7)		**[Zoom]** **Enacting justice-oriented science teaching** - Assignment Share-out - Opening Activity o Phenomena Spotlight o Classroom Scenarios - Lesson plan design o Review: the previous classes and assignments o Coherence across lesson design components - **8.** Assessment design - Individual check in with Won	
9 (11/14)		**[Asynchronous]** **Review Quiz & Individual Work** - Work on your ECJ science lesson design	**9.** Review Quiz
10 (11/21)		**[Zoom]** **Lesson Design Showcase & Finale** **What do you bring with you from the course?** Teaching Demonstration (15 min each, Peer Feedback)	**10-1.** Course ending survey **10-2.** Final lesson plan **(Due: 12/1.Fri. 11:59pm)**

Assessments & Grading Criteria

Final grades will reflect your contributions to our community's growth as pre-service teachers, including but not limited to attendance, punctuality, participation in class sessions, completion and quality of course assignments, critical reflection of theory, research and practice.

Attendance and punctuality

Please refer to the performance policies about Attendance, Punctuality & Communication (below at p. 5). Attendance and participation in all class meetings is required. Absence and lack of punctuality can immediately affect your final grades. If you are going to be absent from class, please email me to inform me of your absence. You will still be responsible for any missed content.

Assignments and participation

Your work will be graded according to the criteria specified on the rubrics for each assignment. Grades are based on the quality of work and professional conduct, rather than how one student's work compares to that of his/her peers. Grade concerns will be addressed individually outside of class time. Please contact me via email as soon as a concern arises.

- All assignments are expected on their due dates. I cannot be responsible for papers submitted at other times or in other formats. Unless we have made special arrangements beforehand, late assignments will be subject to a loss of points.
- All written and oral assignments must reflect graduate-level standards. As a future teacher, you must be able to model communication skills for your students.

- For any assignments done in pairs/small groups, both partners/all group members will receive the same grade, unless otherwise stated.

Final letter grades
Final letter grades are assigned on the standard scale based upon a possible total of 100 points (once cumulative course points are converted).

A	94-100	**C+**	77-79
A-	90-93	**C**	74-76
B+	87-89	**C-**	70-73
B	84-86	**D+**	67-69
B-	80-83	**D**	63-66

Incomplete grades
Under certain circumstances, a student may request an Incomplete. See the *School of Education and Counseling Psychology Bulletin* for details. If you have any concerns about your ability to fulfill the course requirements by the due dates, contact me right away to explain your situation.

Professional Conduct and Performance Policies

Professional conduct and performance policies are germane to your mastery of TPE 6- "Developing as a Professional Educator." If needed, I may contact you individually and privately to discuss the issue, clarify the expectations, and offer my support in helping you reach those expectations. When you would like specific feedback on your professional conduct during the quarter, you are welcome to contact me at any time and I will be glad to discuss with you. Regarding the performance policies, this section points out the details of attendance, punctuality and communication as well as responsible participation and academic integrity.

Attendance, Punctuality & Communication
Attendance and punctuality are the only policies with the immediate potential to impact your course grades. I as your instructor gather data documenting your adherence to the remaining policies listed here through ongoing observation and documentation.

Attendance. Regular attendance at all class meetings is a requirement in this program. Refer to the following attendance policy.
1) Points deducted from the final grade of the course
- 1 unexcused absence – 20 points deducted from the final grade.
- 2 absences –40 points deducted from the final grade.
- 3 or more unexcused absences – dropped

2) Each of you will be granted 1 Emergency Release (ER) per course. Your ER excuses you from losing points. To use your ER, you must notify me by email or phone BEFORE class. Save your ER for medical issues, family demands, car trouble, etc.
- Points will *not* be deducted if the absences are due to the observance of religious holidays that fall on our scheduled class day; please give me advance notice of these absences so I can make the necessary accommodations.
- Because so much of the course content is learned through participation in class activities and other experiences, it is not possible to make up for missing a class session.

- However, there are ways you can engage with the content, join the conversation, and try to fill the knowledge gaps that are the result of your absence. If you must miss a class session, do the following things:
  - Complete and submit on time all assignments due for the class session.
  - Download and review the PowerPoint presentation and any handouts and discussion notes from class (all posted on Camino).
  - Talk with your classmates to get their sense of the main "takeaways" of the session.

Punctuality. Coming to class (and returning from breaks) on time is another course requirement. Your first late arrival will be excused; your second late arrival will cause 5 points to be deducted from your final course grade; your third late arrival will cause 10 points to be deducted. More than three late arrivals indicate a serious problem; this situation will be dealt with at my discretion.

- Despite excellent grades on assignments and other aspects of professional conduct, you may earn a lower course grade as a result of excessive absence or chronic lateness.
- Knowing that there are times when unexpected circumstances arise that may result in late arrival, please email me ahead of time (or as soon as possible) when this occurs.

***Communication*.** Email and our Camino website will be our primary means of communication outside of class. **You must check your SCU email account and Camino messages every day to ensure you maintain a connection with your classmates and me.** To access course materials and participate in online activities, please be sure to review Camino. Reminders, tools, readings and assignment descriptions will be made available through this on-line course management system. Your SCU username and password gets you access to Camino.

Responsible Participation & Academic Integrity

As we read and study in this course, everyone's learning is enhanced by the quantity and quality of the interactions in the learning environment. Hence, your participation in whole class discussions, small group, and pair work is essential for the success of this course.

***Participation*.** We, as future teachers working toward equitable education, will engage in respectful, thoughtful participation in class activities and discussion.

- We should take responsibility for our own learning and support the learning of our peers. To fully participate in the course activities, the assignments must be completed before the class session in which they are due. As indicated above, assignments are still due per course outline even in the event of an excused absence and late arrival.
- The quality of our class sessions and the depth of your learning depend directly on your prepared participation. Please be prepared for class based on the expectations outlined in the course syllabus and by the class norms.

Responsible use of technology. Electronic devices should be used during class to support learning While a class is in session, please refrain from engaging in any activity not directly related to what is taking place in the classroom. I may ask you to close your laptop or put away some other forms of technology. In some instances, the inappropriate use of technology in class may result in points being deducted from the final grade. If you would like more detailed clarification about the expectations regarding appropriate in-class technology use, please feel free to contact me for further information.

Academic integrity. Santa Clara University insists on honesty and integrity from all members of its community; see www.scu.edu/academic-integrity for details. You are expected to do your own work and to cite any sources they use. When identified by dishonest acts in an examination, paper, or other required

work for a course, or assisting others in such acts, the students will receive a grade of F for the course. In addition, such dishonest acts will immediately dismiss the students from the University. Students that violate copyright laws, including those covering the copying of software programs, or who knowingly alter official academic records from this or any other institution, are subject to disciplinary action.

Statement for Equity and Wellness

Respect for diversity. This course serves students from all diverse backgrounds and perspectives. The diversity you bring to this class can be viewed as a resource, strength and benefit. I will do my best to present materials and activities that are respectful of diversity: gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture. Your suggestions are encouraged and appreciated. Please let me know ways to improve the effectiveness of the course for you personally or for other students or student groups. If any of our class meetings conflict with your religious events, please let me know so that we can make arrangements.

Gender inclusive language. This course affirms people of all gender expressions and gender identities. If you go by a different name than what is on the class roster, please let me know. Using correct gender pronouns is important to me, so I encourage you to share your pronouns with me and correct me if I make a mistake. For more on personal pronouns see www.mypronouns.org

Wellness statement. Jesuit education is grounded in concern for the whole person—mind, body, and spirit— and SCU has many resources and programs to support you. Resources that assist with mental wellness and mindfulness can be found through the Cowell Center and Campus Ministry, to name but a few. University students may experience stressors or setbacks from time to time that can impact both their academic experience and their personal well-being. These may include academic pressure or challenges associated with relationships, mental health, alcohol or other drugs, identities, finances, etc. If you are experiencing difficulties, seeking help is a courageous thing to do for yourself and those who care about you. If you are concerned with your progress in this class, please contact me so that we can find solutions together. Drahmann Center can also offer support with issues regarding your academic progress more broadly. For personal concerns, SCU offers many resources, some of which are listed on the Cowell Center website. We are here as a support system for one another. Below are some resources and opportunities that can help us further.

Department of Education and University Resources

Academic action plan. Students who are struggling to meet course expectations will be placed on an Academic Action Plan (AAP). The purpose of the AAP is to document the areas of difficulty, the support to be provided, and the time frame in which the student must improve performance. More information about the AAP is available in the MATTC Handbook.

Disability accommodations. If you have a documented disability for which accommodations may be required in this class, please contact the Office of Accessible Education (OAE) (Benson 1, http://www.scu.edu/oae, 408-554-4109) as soon as possible to discuss your needs and register for accommodations with the University. If you have already arranged accommodations through OAE, please discuss them with me during my office hours within the first two weeks of class. Students who have medical needs related to pregnancy may also be eligible for accommodations.

While I am happy to assist you, I am unable to provide accommodations until I have received verification from OAE. OAE will work with students and faculty to arrange proctored exams for students whose accommodations include double time for exams and/or assisted technology. (Students with approved accommodations of time-and-a-half should talk with me as soon as possible). OAE must be

contacted in advance to schedule proctored examinations or to arrange other accommodations. OAE would be grateful for advance notice of at least two weeks.

Accommodations for pregnancy and parenting. In alignment with Title IX of the Education Amendments of 1972, and with the California Education Code, Section 66281.7, Santa Clara University provides reasonable accommodations to students who are pregnant, have recently experienced childbirth, and/or have medically related needs. Pregnant and parenting students can often arrange accommodations by working directly with their instructors, supervisors, or departments. Alternatively, a pregnant or parenting student experiencing related medical conditions may request accommodations through OAE.

Writing support. The HUB Writing Center (22 Benson Center) offers a variety of services, such as peer tutoring. For more details, please visit: http://www.scu.edu/provost/writingcenter/.

Technology support. SCU can provide you with technology assistance, and you can also reach out to our providers directly for questions. For Camino support, contact caminosupport@scu.edu or call 408-5513572. You can also use the help button within the Camino platform (on the left-hand navigation) for 24/7 support via chat or phone.

- For Zoom assistance, contact Media Services at mediaservices@scu.edu or 408-554-4520. You can also get 24/7 support from Zoom by calling 1-888-799-8854.
- For SCU network and computing support, contact the SCU Technology Help Desk at techdesk@scu.edu or 408-554-5700. They can provide support for MySCU Portal, Duo, ecampus, hardware and software issues, and more.

Course recordings. Online class meetings will be recorded and made available on Camino. As is stated in the existing Student Conduct Code: "...Dissemination or sharing of any classroom recording without the permission of the instructor would be considered "misuse" and, therefore, prohibited. Violations of these policies may result in disciplinary action by the University. At the instructor's discretion, violations may also have an adverse effect on the student's grade."

Discrimination and sexual misconduct (Title IX). Santa Clara University is committed to providing a safe learning environment for all students that is free of all forms of discrimination, sexual harassment, and sexual violence. SCU has dedicated staff trained to support you in navigating campus resources, accessing health and counseling services, providing academic and housing accommodations, helping with legal protective orders, and filing a formal complaint with the university or with law enforcement. Here are key resources:

- Confidential Survivor Advocate, (408) 551-3307;
- Counseling & Psychological Services (CAPS), (408) 554-4501; and
- Equal Opportunity and Title IX Office, (408) 551-3043.

Cases reported to the Office of Equal Opportunity and Title IX are fully investigated. As their investigation is required to be neutral, not to advocate and counsel students who have experienced sexual violence or harassment, SCU (and with the strong support of the Title IX office) has also hired an advocate outside the Title IX office, who is Bree Van Ness, Confidential Survivor Advocate, Wellness Center: bvanness@scu.edu; https://www.scu.edu/wellness/survivor-advocacy--support/. A comprehensive list of on- and off-campus Student Resources is available on the Equal Opportunity & Title IX website.

Reporting practices. While I want you to feel comfortable coming to me with issues you may be struggling with or concerns you may be having, please be aware that there are some reporting

requirements that are part of my job at Santa Clara University. For example, if you inform me of an issue of harassment, sexual violence, or discrimination, I will keep the information as private as I can, but I am required to bring it to the attention of the institution's EEO and Title IX Coordinator. If you inform me that you are struggling with an issue that may be resulting in, or caused by, traumatic or unusual stress, I will likely inform the campus Student Care Team (SCU CARE). Please be aware that if, for some reason, our interaction involves a disruptive behavior, a concern about your safety or the safety of others, or potential violation of University policy, I will inform the Office of Student Life. The purpose of this is to keep OSL apprised of incidents of concern, and to ensure that students can receive or stay connected to the academic support and student wellness services they need.

Appendices

Appendix A. Descriptions of Assignments
[All assignments are individual, during/after-class tasks]

1-1. Course-opening survey (5)
- Format: Google form
- Respond to all required questions

1-2. Course Start Quiz (5)
- Format: **Camino**
- Respond to all questions

2. Connecting ECJ to NGSS Disciplinary Core Ideas
- Format: one page in a shared slide deck
- Procedure and Criteria
    - Clarity and precision in content (4 pts):
        - Respond to the task prompt given during session 2 class.
            - Prompt: From your subject areas, identify Disciplinary Core Ideas (one dimension of science learning proposed by NGSS) that are related to the issues of environment, climate, and sustainability.
        - Reason precisely why/how you relate them.
        - Provide an example(s).
    - Peer feedback (1 pts): Analyze and comment on your classmates' responses with constructive critique.
        - If you should be absent, your pre-/post-participation will still be encouraged.
    - Partial points (50% per each) are assigned for unmet criteria.

3. 5E-based, NGSS-informed, ECJ-integrated science unit brainstorming (10)
- Format: one page in a shared slide deck
- Procedure and Criteria
    - Clarity and precision in content (8 pts):
        - Building on the session 3 discussion/activity, identify a science unit you want to design as a signature assignment of this course.
        - I recommend you to actually implement the lesson you will design. As such, consider your students' grade level and your school's curricular schedule, and content of other subjects you can integrate with.
        - Reason why you specifically chose the unit.
        - Reason how you consider the unit can address the ECJ topics or issues: Provide an example(s).
    - Peer feedback (2 pts): Analyze and comment on your classmates' ideas with constructive critique.
        - If you should be absent, your pre-/post-participation will still be encouraged.
    - Partial points (50% per each) are assigned for unmet criteria.

4. Learning goal setting (5)
- Format: one page in a shared slide deck
- Procedure and Criteria

- Refine learning goals of your target lesson within the unit of your choice (for the signature assignments). (4 pts).
  - Make sure the SMART criteria for learning goals (Specific, Measurable, Achievable, Relevant, Timely).
  - Make sure that the learning goals align with NGSS standards statements, your students' activities, main contents taught, and assessment items.
- Peer feedback (1 pts): Analyze and comment on your classmates' learning goals.
  - If you should be absent, your pre-/post-participation will still be encouraged.
- Partial points (50% per each) are assigned for unmet criteria.

5. CER talk activity design (5)

- Format: one page in a shared slide deck
- Procedure and Criteria
  - Clarity and precision in content (4 pts):
    - Respond to the task prompt given during the session 5 class.
      - Prompt: Design one student-activity to elicit their CER discussion (e.g., question prompts? Experiment?, worksheet activity?). Also, anticipated responses in the format of CER
  - Peer feedback (1 pts): Analyze and comment on your classmates' responses with constructive critique.
    - If you should be absent, your pre-/post-participation will still be encouraged.
  - Partial points (50% per each) are assigned for unmet criteria.

6. Learning from your students (5)

- Format: in your lesson design document
- Procedure and Criteria
  - Building on the session 6 discussion/activity,
    - Describe your students' demographics. & Reflect on your students and identify 1 to 3 students you'd focus on, to support their equitable science learning experiences (4 pts).
  - Listening to peers (1 pts): Listen to your peers' stories of students and introduce the stories to other classmates.
  - Partial points (50% per each) are assigned for unmet criteria.

7. Action-oriented activity design (5)

- Format: in your lesson design document
- Procedure and Criteria
  - Clarity and precision in content (4 pts):
    Building on the session 7 discussion/activity, add an action-oriented activity to your lesson design document:
    1. Which type of action-oriented activity?
    2. Things to consider and set up in advance (e.g., resources, contact to experts/community/organization?)
  - Peer feedback (1 pts): Analyze and comment on your classmates' activity ideas.
    - If you should be absent, your pre-/post-participation will still be encouraged.
  - Partial points (50% per each) are assigned for unmet criteria.

8. Assessment design (5)

- Format: in your lesson design document
- Procedure and Criteria

- Building on the session 8 discussion/activity, develop assessment questions for your target lesson within the unit of your choice (for the signature assignments). (4 pts).
  - Make sure that the assessment questions align with NGSS standards statements, learning goals, your students' activities, and main contents taught.
- Peer feedback (1 pts): Analyze and comment on your classmates' assessment items.
  - If you should be absent, your pre-/post-participation will still be encouraged.
- Partial points (50% per each) are assigned for unmet criteria.

9. Review Quiz (15)

- Format: **Camino**
- Respond to all questions

10-1. Course-ending survey (5)

- Format: Google form
- Respond to all required questions

10-2. Final lesson plan (Signature Assignment) (30) Due: 12/1. Fri. 11:59pm

Develop a science lesson plan that centers the goal of raising and acting on *environmental consciousness toward justice* into your science instruction.

- Here, 'a' science lesson is considered a plan that falls under a set of connected learning goals, having opening and ending remarks, which may last 1 to 2-ish hours.
- Assume a specific grade level and concretize your lesson plan according to students' developmental stages.
- Be creative in determining the main topic, student activities, and teacher strategies; then, make sure they are aligned with learning goals and assessment items.
- If you have pre-developed lesson plan(s), you can revise one of them to meet the given template and required sections below.

Format

- 8 to 10 pages (with main text 12pt, single-spaced).
  - You may use supplementary resources (e.g., images, example worksheet), but they are not counted to be the page number.
- Use the given template (you will see the points assigned to each component).

Rubric

- For detailed rubric, see Appendix B.
- As a signature assignment of this course, Science Lesson Planning entails the six major components related to prior assignments. See the table below.

Component	Description	Related Assignment
1. Description of Students' assets and learning needs	• Explain students' knowledge related to the unit and lesson you design, identified from a student survey (e.g., google survey, oral discussion, your noticing from previous lessons) you have conducted.	**6. Learning from your students (5)**
2. Lesson Context	• Explain the unit in which the lesson is situated.	**2. Connecting ECJ to NGSS Disciplinary Core Ideas**

	● Which E(s) among 5E instruction model are applied to the lesson of choice.	**3. 5E-based, NGSS-informed, ECJ-integrated science unit brainstorming (10)**
3. Integration Plan	● Elaborate how ECJ topics were integrated.	
4. Lesson Overview	● Present SMART learning goals ● Identify subject standards ● Align assessment content with learning goals	**5. Learning goal setting (5)** **8. Assessment design (5)**
5. Detailed Lesson Plan	● Align student activities with learning goals and assessment content ● Algin student activities with the E(s) you chose from 5E instructional model. ● Elaborate each of lesson sections: Opening, Main activity, Closure ● Use one or more of the following activities: o CER discussion, o Hands-on (e.g., experiment, making), o Action-oriented, o Online tools utilized (e.g., resources) ● Attach or hyperlink instructional materials that will be used in class (e.g., slide deck): o Allow me to access the material o The added materials are not counted in the page number.	**4. CER talk activity design (5)** **7. Action-oriented activity design (5)**
6. Accommodation plan	● Elaborate the accommodation plan to facilitate learning of all students.	**6. Learning from your students (5)**

Appendix B. Assessment Rubric (for the signature assignment: Science Lesson Design)

Component	Exceeding	Meeting	Approaching	Developing
Description of Students' Assets and Learning Needs	All of the following are clearly and precisely stated (0.5 point each)	One of the followings is moderately addressed or missing	Two of the followings are moderately addressed or missing	All of the following were underdeveloped.
	Drawing on the student survey you would have conducted (assignment 5.3), address the following: 1) Academic knowledge related to the unit 2) Knowledge, interests, and skills from cultural and personal experiences inside and outside of the classroom (those you can utilize for the unit) 3) Contextual Information for the Class			
	1.5	1.0	0.5	0
Lesson Context	All of the following are clearly and precisely stated (0.3 each)	3 to 4 of the followings are clearly and precisely stated	1 to 2 of the followings are stated	All of the following were underdeveloped.
	1) the title of unit in which this lesson is situated 2) summary of what students will learn from the unit 3) description of where the focus lesson sits within the unit 4) the phases of 5E instructional model applied to the lesson 5) unit content before and after the choice lesson			
	1.5	0.9-1.2	0.3 -0.6	0
Integration Plan (ECJ)	All the following components are clearly stated:	Some components are addressed so that the total points are between 3-4.	Some components are addressed so that the total points are between 1-2.	None of the following component is addressed.
	1) ECJ-oriented learning goals are stated (1 pt) 2) Academic standards of the lesson are related to ECJ topics (1 pt) 3) How the lesson is ECJ-oriented is explained (1 pt) 4) How students' activities are ECJ-oriented is clearly indicated (1 pt) 5) ECJ-oriented science content is assessed (1 pt)			
	5.0	3-4	1-2	0
Integration Plan (Other subjects)	The content and skills of other subjects are integrated explicitly.	The content and skills of other subjects are integrated moderately.	The content and skills of other subjects are integrated superficially.	The content and skills of other subjects are hardly integrated.
	1.0	0.7	0.4	0
Student Academic Learning Goals	Student learning goals present: 1) what students will be able to do as a result of the lesson (0.5); 2) specifically (0.2); 3) measurably - qualitatively and/or quantitatively (0.3).	Student learning goals present: 1) what students will be able to do as a result of the lesson (0.5), 2) with a moderate specificity and measurability (0.25).	Student learning goals do not provide a clear sense of what students will know and be able to do as a result of the lesson.	Student learning goals are missing or unclear.
	1.0	0.75	0.4	0

Student Language Learning Goals	Student learning goals present: 1) what students will be able to do as a result of the lesson (0.5); 2) specifically (0.2); 3) measurably - qualitatively and/or quantitatively (0.3).	Student learning goals present: 1) what students will be able to do as a result of the lesson (0.5), 2) with a moderate specificity and measurability (0.25).	Student learning goals do not provide a clear sense of what students will know and be able to do as a result of the lesson.	Student learning goals are missing or unclear.
	1.0	0.75	0.4	0
Content Standards	Relevant standards are referenced and clearly influence all academic learning goals.	Relevant standards are referenced and moderately influence academic learning goals.	Relevant standards are referenced and loosely related to learning goals.	No standards are mentioned or; Learning goals are unrelated to the standards.
	1.0	0.75	0.4	0
Language Standards	Relevant standards are referenced and clearly influence all academic learning goals.	Relevant standards are referenced and clearly influence 3/4 and more of academic learning goals.	Relevant standards are referenced and loosely related to learning goals.	No standards are mentioned or; Learning goals are unrelated to the standards.
	1.0	0.75	0.4	0
Materials and Preparation	All of the following are clearly detailed: 1) preparation instructions, and 2) pertinent safety issues and preventive plan. (0.2 point each)	Two of the following are moderately addressed: 1) preparation instructions, and 2) pertinent safety issues and preventive plan.	One of the following are clearly detailed: 1) preparation instructions, and 2) pertinent safety issues and preventive plan.	List of materials and preparation instructions are missing or underdeveloped.
	0.4	0.2	0.1	0
Link to the major instruction material	All of the following are clearly addressed: 1) shared with the course instructor, 2) developed in detail, 3) in accordance with the lesson plan (0.2 point each)	Two of the following are clearly addressed: 1) shared with the course instructor, 2) developed in detail, 3) in accordance with the lesson plan	One of the following clearly addressed: 1) shared with the course instructor, 2) developed in detail, 3) in accordance with the lesson plan	None of the following are explained: 1) shared with the course instructor, 2) developed in detail, 3) in accordance with the lesson plan
	0.6	0.4	0.2	0
Detailed Lesson Plan	The following are clearly and precisely stated.	The following are stated at a moderate detail.	The following are briefly outlined.	None of the following are stated.

	1) description of each student activity (including examples of students' statements/actions anticipated) (3 pts) 2) description of instructional strategies (including examples of teacher talk moves) (3 pts) 3) headers and timestamps for respective activities (1 pt) 4) grouping strategies (1 pt)			
	8.0	5-7	2-4	0-1
Adaptations for students in different learning needs	Adaptive strategies for each of the following students' groups are clearly specified, and the strategies are doable 1) English learners; 2) Students with identified special needs; 3) Students with hardship	Adaptive strategies for each of the following students' groups are moderately stated. Or the adaptive strategies can work for two of the three groups	Adaptive strategies for each of the following students' groups are vague and abstract than practical: 1) English learners; 2) Students with identified special needs; 3) Students experiencing hardship	No adaptive strategies for the following students' groups are offered. 1) English learners; 2) Students with identified special needs; 3) Students experiencing hardship
	1.0	0.75	0.4	0
Assessment	All the informal, student-self, and formal assessment items are utilized	Two of the informal, student-self, and formal assessment items are utilized.	One of the informal, student-self, and formal assessment items is utilized.	No assessment items are utilized
	2.0	1.5	0.8	0
Closure	Concluding remark recaps learning goals and student activities and preview the next lesson.	Concluding remark recaps either learning goals or student activities, and preview the next lesson.	Concluding remark recaps either learning goals or student activities, without previewing the next lesson.	No closing remark was present.
	3.0	2	1	0
Alignment and Consistency	Clarify the alignment and consistency among different lesson components.	Alignment and consistency among lesson components are moderately explained.	The alignment and consistency among different lesson components are underdeveloped.	The alignment and consistency among different lesson components are missing.
	2.0	1.5	0.8	0

Appendix C. Additional Resources and Materials

Resources

National Academies of Sciences, Engineering, and Medicine (2015). *Science teachers' learning: Enhancing opportunities, creating supportive contexts*. Committee on Strengthening Science Education through a Teacher Learning Continuum. Board on Science Education and Teacher Advisory Council, Division of Behavioral and Social Science and Education. Washington, DC: National Academies Press. http://www.nap.edu/catalog/21836/science-teachers-learning-enhancing-opportunities-creating-supportive-contexts

Next Generation Science Standards

Teaching Tools for (STEM) Education

Social Justice Mathematics and Science Curricular Resources for K-12 Teachers

Working Together: Science Teachers and Students with Disabilities

Family Involvement in the Ed Dev. Of Youth with Disabilities

For student-enacted activities: https://www.howtosmile.org/

For more practice briefs: Stemteachingtools.org

Specific UDL practices/activities: https://www.overcomingobstacles.org/portal/en

"UDL In a Nutshell" https://www.youtube.com/watch?v=gmGgplQkrVw

Digital educational resources https://wakelet.com/wake/UVjkGGmnMPz33u01tNa-2

California department of education publications and resources

California department of education– Common Core resources for special education https://www.cde.ca.gov/sp/se/cc/

California Commission on Teacher Credentialing (CTC). (2016). California Teaching Performance Expectations. Sacramento, CA: Author. https://www.ctc.ca.gov/docs/default-source/educatorprep/standards/adopted-tpes-2016.pdf?sfvrsn=8cb2c410_0

California Department of Education (CDE). (2018). Response to Instruction & Intervention (RtI2). Retrieved June 10, 2021, from https://www.cde.ca.gov/ci/cr/ri/

2016 California Science Framework

California Department of Education website, specialized programs

Science Safety Handbook for California Public Schools

Safety practices and regulations; Safety in the Media; Science Activity Safety Checklist

Safety and the Next Generation Science Standards

Mental Wellness and mindfulness

https://www.scu.edu/provost/policies-and-procedures/teaching-expectations/

https://www.scu.edu/provost/teaching-and-learning/faculty-collaborative-for-teaching-innovation/cafe/cafe-4/#d.en.679541