San José State University
College of Science/Science Education Program

SCED 285 Seminar in Science Education, Spring 2020

Course and Contact Information

Instructor:	K. Virginia Lehmkuhl-Dakhwe PhD
Office Location:	DH 008
Telephone:	(408) 924-4809
Email:	virginia.lehmkuhldakhwe@sjsu.edu
Office Hours:	Thursdays, 3-4 pm or by appointment
Class Days/Time:	Thursdays, 4-6:45pm
Classroom:	Duncan Hall, 246

Course materials such as the course syllabus, readings, and assignment instructions can be found on the Canvas learning management system course website. You are responsible for regularly checking Canvas messaging and email to learn of course updates. You are encouraged to bring a laptop to each class session.

Course Description

The Next Generation Science Standards (NGSS Lead States, 2013) articulate eight practices of science and engineering identified as essential for all students to learn. Practices such as *Planning and carrying out investigations*, *Analyzing and interpreting data*, and *Developing and Using models* tend to be habitually addressed in science classrooms. Arguably, students are provided relatively fewer opportunities to engage in the practice of *Using mathematics and computational thinking*. Addressing this inadequacy in science education is becoming increasingly important as there is growing emphasis on providing all K-12 students with the opportunity to participate in computer science and computational thinking education. Through programs such as the National Science Foundation's *Computer Science for All research and researcher-practitioner partnerships*, large scale efforts are under way that will foster the research and development needed to bring computer science and computational thinking to all students.

This course will support students in developing fluency in computational thinking and its elements and will review literature and research that exists on relevant topics. It will also survey and review the attributes and research relevant to functional researcher-practitioner partnerships and their role in influencing classroom practices across disciplines. Students will synthesize and reflect on the readings and their own research interests and classroom practices to expand and deepen their own individual work in the course and the Science Education Program.

Program Learning Outcomes (PLOs):

1. Students will be able to synthesize recent literature from science education research and apply how it fits into their own individual work in the Science Education Program;
2. Students will demonstrate knowledge of at least two areas of study within science education research more broadly by utilizing these sub-fields in their final project.

Course Learning Outcomes (CLOs):

1. Critically read peer-reviewed articles in science education;
2. Engage in authentic discussions on education research with researchers and peers;
3. Write thoughtful and original reflections on emerging research in science education;
4. Discuss and leverage multiple conceptual frames for making sense of data and research.

Class Readings & Textbook

All required readings will be provided via Canvas.

Course Requirements and Assignments

SJSU classes are designed such that in order to be successful, it is expected that students will spend a minimum of forty-five hours for each unit of credit (normally three hours per unit per week), including preparing for class, participating in course activities, completing assignments, and so on. More details about student workload can be found in University Policy S12-3 at http://www.sjsu.edu/senate/docs/S12-3.pdf.

Reading, Classroom Discussion/Activity Participation, and Written Reflections (40%): To deepen content knowledge, critically review literature, and provide context for reflecting upon their research, students will be expected to complete reading assignments and to participate in class discussions. Each class, students will demonstrate understanding of the reading by completing in-class writing activities such as reflections, exit tickets, and other in-class written work.

Classroom Discussion Facilitation (30%): Students will be expected to select 2 papers and lead discussion and reflection activities for these papers during two class periods over the course of the semester.

Final Examination or Evaluation (30%): The culminating activity for this course consists of a communication piece where students reflect on their research and their perspectives as a practitioner and as a researcher in light of reports, research, and outcomes from researcher-practice partnerships. Students will submit a short proposal document mid-semester outlining the topic and the type of communication piece that they will prepare. All students will present their work in the last class period.

Grading Information:

Late assignments: Assignments submitted after their specified due date and time will be deducted 20% total points for the assignment for each day past the due date/time.

Grade Scale:

Point Range	Letter Grade
95.0-100	A
90.0-94.9	A-
87.0-89.9	B+
84.0-86.9	B
80.0-83.9	B-
77.0-79.9	C+
74.0-76.9	C
70.0-73.9	C-
67.0-69.9	D+
64.0-66.9	D
60.0-63.9	D-
<60.0	F

No Extra Credit Assignments will be given.

Classroom Protocol

Students are expected to attend all class meetings. Advance notice of missed class meetings is expected. Students will display professional courtesy by responsibly using technology during class time.

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/

SCED 285 Spring 2020 Course Schedule

This Class Schedule is Subject to Change with Advance Notice via Canvas Announcements and/or email.

Date	In Class Topics/Activities	Assigned
1/23/2020 Week 1	• Introductions and Overview • Identity mapping	☐ Readings: **Research-Practice Partnerships: A Strategy for Leveraging Research for Educational Improvement in School Districts (pages 1-13)* **Impact of Project-Based Curriculum Materials on Student Learning in Science: Results of a Randomized Controlled Trial*
1/30/2020 Week 2	• Investigate the *Researcher-Practice Partnership* (Part 1) • Review the *Next Generation Science Standards (NGSS)* & the structure of a research article	☐ Readings: **Research–Practice Partnerships in Education: Outcomes, Dynamics, and Open Questions* **Improving Teaching and Learning through Instructional Rounds* ☐ Reading: Student-assigned (see Canvas)
2/6/2020 Week 3	• Investigate the *Researcher-Practice Partnership* (Part 2) • The *Problem of Practice* • ***Student-led paper discussion***	☐ Reading: **Multiple Audiences for Encouraging Research Use: Uncovering a Typology of Educators* ☐ Reading: Student-assigned (see Canvas)
2/13/2020 Week 4	• Investigate the *Researcher-Practice Partnership* (Part 3) • Develop a working definition of *Computational Thinking* • ***Student-led paper discussion***	☐ Readings: **Exploring the science Framework and NGSS: Computational thinking in the science classroom* **Modeling and Measuring Students' Computational Thinking Practices in Science* ☐ Reading: Student-assigned (see Canvas)
2/20/2020 Week 5	• *Computational Thinking* and the *NGSS* (Part 1) • ***Student-led paper discussion***	☐ Reading: **Computational Thinking in K–12: A Review of the State of the Field* ☐ Reading: Student-assigned (see Canvas)
2/27/2020 Week 6	• *Computational Thinking* and the *NGSS* (Part 2) • ***Student-led paper discussion***	☐ Readings: **Assessing Computational Thinking Across the Curriculum* **A Framework for Computational Thinking across the Curriculum* ☐ Reading: Student-assigned (see Canvas)
3/5/2020 Week 7	• *Computational Thinking* across subjects • ***Student-led paper discussion***	☐ Reading: **Computational Thinking in Computer Science Classrooms: Viewpoints from CS Educators* ☐ Reading: Student-assigned (see Canvas)
3/12/2020 Week 8	• *Computational Thinking* and *K-12 Computer Science* • ***Student-led paper discussion***	☐ Reading: **Review of Computer Science Education & Standards in the State of California* ☐ Reading: Student-assigned (see Canvas)
3/19/2020 Week 9	• **Guest presenter and Activity**	☐ Case Study 1: Addressing *Computational Thinking* in a Classroom
3/26/2020 Week 10	• **Guest presenter and Activity**	☐ Case Study 2: Addressing *Computational Thinking* in a Classroom
4/2/2020 Week 11	• Spring Break- No Class	

Date	In Class Topics/Activities	Assigned
4/9/2020 Week 12	• *Computer Science Education* in the State of California • ***Student-led paper discussion***	☐ Reading: **Building Student Ownership and Responsibility: Examining Student Outcomes from a Research- Practice Partnership* ☐ Reading: Student-assigned (see Canvas)
4/16/2020 Week 13	• Researcher-Practice partnerships and impacts on student learning • ***Student-led paper discussion***	☐ Reading: **The Impact of Adapting a General Professional Development Framework to the Constraints of In-Service Professional Development on the Next Generation Science Standards in Urban Settings* ☐ Reading: Student-assigned (see Canvas)
4/23/2020 Week 14	• Researcher-Practitioner partnerships and impacts on teacher professional learning • ***Student-led paper discussion***	☐ Readings: **Research-Practice: A Practical Conceptual Framework* **Computer Science for All – Results from Research-Practice partnerships* ☐ Reading: Student-assigned (see Canvas)
4/30/2020 Week 15	• The *Computer Science for All Research-Practitioner Partnership* • ***Student-led paper discussion***	☐ Prepare for Final presentations
5/7/2020 Week 16	Last Class Meeting	☐Final presentations