

**San José State University**  
**Science Education Program**  
**SCED 205, Methods of Research, Spring 2022**

**Course and Contact Information**

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|------------------|--|
| Instructor(s):   | Dr. Jennifer Avena (Preferred pronouns: she/her)   |
| Email:           | <a href="mailto:jennifer.avena@sjsu.edu">jennifer.avena@sjsu.edu</a> (Preferred mode of contact)   |
| Office Hours:    | Tuesdays 3-4 PM and Thursdays 12-1 PM or email me to set up an appointment at Zoom Link provided on Canvas Home page   |
| Class Days/Time: | Mondays, 4-6:45 PM   |
| Classroom:       | All materials and links accessible through the <a href="#">Canvas Learning Management System</a> . Zoom Link: use the Zoom link on the Canvas Navigation tab or Calendar to access (must be logged in to Zoom with your SJSU credentials, and you will first enter a waiting room) |

**Course Description**

Introduction to techniques and procedures of scientific research. Each student is required to prepare and defend a working outline of a master's thesis or project in his or her area of concentration.

**Course Overview**

This course is guided by two questions:

1. *What is inquiry in education?*
2. *How can we study and develop materials that address interesting problems of teaching and learning?*

These questions are more complex than they first appear. Answering a simple question can quickly lead to considerations about what counts as knowledge, what knowledge is, knowing as an activity and how we define ourselves as learners. It requires examination of approaches to answering these questions and interrogation of what approaches lead to which kinds of answers and why. There are also practical issues—how does one gain proficiency in the practices of educational design and research and what are the ethical implications of educational inquiry?

Researchers have debated all of these questions throughout the history of educational inquiry and this course does not seek to provide a resolution. Rather, through consideration, examination of and practice with inquiry techniques we will define a problem that your masters project will address and develop a proposal for how you will address that issue.

**Respect for Diversity**

My goal is that this course will respect and value the diversity of students from all backgrounds and experiences. This diversity is a resource for all aspects of our class, including as we engage in discussions as a whole class as well as in groups. This course is fully online, so we want to keep in mind appropriate netiquette (see details in Canvas) to maintain a professional, respectful, and cooperative online environment. In

accordance with San José State University's Policies, the Student Code of Conduct, and applicable state and federal laws, discrimination based on gender, gender identity, gender expression, race, nationality, ethnicity, religion, sexual orientation, or disability is prohibited in any form. Your feedback and suggestions to improve the course are greatly appreciated, so feel free to reach out to me.

## Course Format

### Online Course

This class will be held entirely online via synchronous Zoom sessions and the Canvas learning management system. You will need access to a computer with Internet to complete assignments and attend Zoom classes. All out-of-class communication with you will be through Canvas. Course materials can be found on the Canvas website: [sjsu.instructure.com](http://sjsu.instructure.com). If you are an Open University student, see us for access to the site. During class, you are expected to participate in activities and discussions. This includes being prepared for class by completing assignments prior to attending as well as contributing to the classroom discourse. The course is a graduate level course; therefore, the expectation is that you are motivated to learn and apply what you learn to the best of your ability.

*Access to technology:* Some internet providers are offering free or low cost internet and opening hotspots free to students: [Internet Essentials](#), [Digital You](#), [Xfinity](#), [Comcast](#). [Student Computing Services](#) has information on how to request a laptop available for loan. If you have any issues accessing online course materials, please contact the IT Service Desk at (408) 924-1530 or [itservicedesk@sjsu.edu](mailto:itservicedesk@sjsu.edu). Additional information also available at [Learn Everywhere](#).

### Canvas Learning Management System and Student Email/ MYSJSU Messaging

Course materials can be found on the [Canvas Learning Management System](#) at <http://sjsu.instructure.com>. You are responsible for regularly checking your SJSU email/mysjsu messaging and Canvas Announcements page to learn of any updates. I suggest that you check your [Canvas Notification Settings](#) to ensure Canvas Announcements will be sent to your SJSU email account. For help with using Canvas see [Canvas Student Resources page](#) ([http://www.sjsu.edu/ecampus/teaching-tools/canvas/student\\_resources](http://www.sjsu.edu/ecampus/teaching-tools/canvas/student_resources))

## Course Goals and Learning Outcomes

### Program Learning Outcomes (PLO)

This course can be taken to fulfill some of the credit hours required for a master's degree in Science Education. Therefore, this course (in addition to others) will help students make progress towards the following program learning outcomes:

**1** – To enhance student's depth and breadth of understanding of selected topics in science education.

**PLO 1.1** Students will be able to synthesize primary literature from science education research and apply how it fits to their project.

**PLO 1.2** Students will demonstrate knowledge of at least two areas (e.g. inquiry based instruction, learning theory, assessment) that are related to, or supportive of research for their project.

**2** – To enhance communication skills, both written and oral, in science education discourse.

**PLO 2.1** Students will present science and science education content in the form of graduate seminars or in the oral defense of their project (also known as the culminating experience).

**PLO 2.2** Students will organize and write the results of their project in a manner consistent with standards in professional science education publications.

## Course Learning Outcomes (CLO)

This course is meant as a general introduction to research in science education.

Upon successful completion of this course, students will be able to:

- CLO 1 Evaluate and communicate the utility of various research questions as they apply to their personal research topic
- CLO 2 Construct measurable research questions motivated by science education literature
- CLO 3 Create a plan for project implementation (ex: data collection, curriculum design, program implementation, etc.) and analysis/reflection as applicable with their master's project
- CLO 4 Create and identify instruments (surveys, interview protocols)
- CLO 5 Write your SJSU Institutional Review Board (IRB) protocol and submit for approval
- CLO 6 Synthesize knowledge from SCED 205, SCED 220 and other educational courses into a coherent written proposal

## Required Texts/Readings

### Textbook

There is no required text to purchase. Assigned readings will be provided in the corresponding topic's module in Canvas.

### Library Liaison

Anne Marie Engelsen (Annemarie.engelsen@sjsu.edu) for Sciences and/or DeeAnn Herrera Tran (deeann.tran@sjsu.edu) for Education

## Course Requirements and Assignments

***In-class (synchronous) participation.*** During the synchronous class, I expect that you will be prepared to actively participate in our class discussions and activities. See Canvas Rubrics for grading details of participation. You may also be asked to submit some in-class assignments as well. You may miss one class period without your participation grade being affected.

*Discussion leader.* On one day over the semester, you will be assigned to be a Discussion leader, in which you will lead the discussion on the reading(s) topic for that week. Specifically, you will choose a primary (empirical) research paper that uses this methodology and present the paper to class. This will include: (1) submitting this primary article by the Sunday prior to the week you are leading the discussion and (2) leading a discussion that connects the paper to the reading and methodology for the week, and submit your presentation, plan, and annotated paper (see Canvas for details). In order to do so, you will develop at least four questions that will prompt an engaging discussion around the concept that leads to greater understanding and considerations of how to apply these concepts. If a discussion board was submitted for this topic as well, you'll want to expand upon the ideas provided in the discussion to introduce new ideas and questions in class. You may consider and build on the reflection question prompts to guide your discussion. On certain days, there may be more than one Discussion Leader, in which case you will want to coordinate your topic and questions with the other Discussion Leader, so each has selected a separate topic and primary article on which to focus; each discussion leader will lead a separate 30 minute discussion. Discussions will typically last 30 minutes at the beginning of class, so you may ask all of your questions or may need to select a subset based on the conversation.

### ***Weekly assignments.***

*Canvas discussion board.* Online discussions will be used to build a collaborative learning community, this on-going assignment involves posting and responding to comments, thoughts, insights or reflections online with respect to the weekly readings and your own related educational experiences. Use this virtual space to connect with other classmates to help you think through the concepts we are learning in the course. As everyone's continuous participation is essential in creating this virtual community, a minimum of 3 posts per week is required—you must create an initial, original post in response to the discussion prompt and two responses to peer posts. **All discussion board assignments are due the Sunday before class by 12:00 PM (80% of points), and response posts are due by 12:00 PM on the Monday of Class (20% of points).** Note: The discussion board in Canvas will indicate a deadline of Monday when both your initial and responding prompts are due, but please remember to post your initial response by Sunday. Additional prompt and grading details will be provided in the Discussion Board and Canvas Rubrics.

*Homework.* Assignments are due by 12:00 PM on the day of class unless otherwise noted on the Canvas site—*make sure to check due dates for all assignments!* The content will depend on the needs of the class, but may contain opportunities to reflect, plan, analyze data, etc.

***IRB (Human Subjects) Application.*** It is essential that all research be conducted ethically, therefore, in addition to studying the ethics around research, in this class you will also be going through the steps of preparing submission of an IRB (Human Subjects) application. We will work to develop an appropriate plan for your treatment of human subjects and develop the required materials including a narrative, consent forms and data instruments (surveys, interviews, etc). In the rare chance that your project is *already approved* by IRB (or that you do not need IRB approval for some other reason) you will still be required to prepare an IRB, and/or work with a partner to prepare their IRB. We will adjust the assignment accordingly on a case-by-case basis. You will submit one draft and one final version.

### **University Course Hour Requirement**

“Success in this course is based on the expectation that students will spend, for each unit of credit, a minimum of 45 hours over the length of the course (normally three hours per unit per week) for instruction, preparation/studying, or course related activities, including but not limited to internships, labs, and clinical practica. Other course structures will have equivalent workload expectations as described in the syllabus.” Students are expected to spend 6 hours per week outside of class on course-related work.

### **Final Examination or Evaluation**

Per SJSU guidelines, “Faculty members are required to have a culminating activity for their courses, which can include a final examination, a final research paper or project, a final creative work or performance, a final portfolio of work, or other appropriate assignment.” Final presentations (science education faculty and relevant college personnel invited) and the final project proposal serve as the final evaluation (culminating activity) for this course.

#### *Proposal (Final)*

You will create a proposal that outlines your project plan for the completion of your MA degree. The specifics of that plan will be outlined to you in Canvas, and you will be given a rubric on which you will be assessed to which to refer as you write. You will also be submitting three drafts prior to this final submission.

#### *Final Presentation*

On Monday, May 16, during class you will present your project proposal to an audience consisting of

your classmates, adviser, and committee members if possible. Details of this proposal will be provided to you in Canvas.

## Grading Information

Students will be graded on the quality of their written assignments, the extent of their participation, and the thoughtfulness, effort and coherence of their final project. Points will be allocated as such:

**In-class participation, work, and discussion 20%**

**Weekly assignments (includes discussion board and homework) 30%**

**Final project proposal (Final proposal, presentation, and drafts) 40%**

**IRB (Final proposal and drafts) 10%**

Due to the nature of the format of the course, it will be difficult to make up work. If you anticipate falling behind, or have an emergency, see me as soon as possible to make a plan. Late work will *be accepted up to one week after the due date*, with a deduction of 5% per day, unless otherwise specified in Canvas rubrics, except in the case of a medical emergency, *with advance notice* if possible. This policy is to promote student success and prevent you from falling behind in assigned work. There is no extra credit for this course.

The following grading scale will be used:

| <i>Grade</i>   | <i>Percentage</i> |
|----------------|-------------------|
| <i>A plus</i>  | <i>98 to 100%</i> |
| <i>A</i>       | <i>93 to 97%</i>  |
| <i>A minus</i> | <i>90 to 92%</i>  |
| <i>B plus</i>  | <i>88 to 89 %</i> |
| <i>B</i>       | <i>83 to 87%</i>  |
| <i>B minus</i> | <i>80 to 82%</i>  |
| <i>C plus</i>  | <i>78 to 79%</i>  |
| <i>C</i>       | <i>73 to 77%</i>  |
| <i>C minus</i> | <i>70 to 72%</i>  |
| <i>D plus</i>  | <i>68 to 69%</i>  |
| <i>D</i>       | <i>63 to 67%</i>  |
| <i>D minus</i> | <i>60 to 62%</i>  |

## Classroom Protocol

Our class will engage in a variety of small group experiences and large group discussions. A successful class will depend on every member of the group actively collaborating as both learners and teachers. It is my assumption that each of us has valuable perspectives and experiences that will inform our collective, developing knowledge. It is important that you come to class on time. I expect that you will have read the texts carefully and will be prepared to actively participate in our class discussions both during synchronous Zoom sessions and on Canvas. Attendance is essential in order for your success in this course. Often times the success of a classroom activity will depend on the attendance of the entire class. Therefore, it is essential that you notify me if you are going to miss class for any reason, as soon as you are able.

## University Policies

Per [University Policy S16-9](http://www.sjsu.edu/senate/docs/S16-9.pdf) (<http://www.sjsu.edu/senate/docs/S16-9.pdf>), relevant university policy concerning all courses, such as student responsibilities, academic integrity, accommodations, dropping and adding, consent

for recording of class, etc. and available student services (e.g. learning assistance, counseling, and other resources) are listed on [Syllabus Information web page](http://www.sjsu.edu/gup/syllabusinfo) (<http://www.sjsu.edu/gup/syllabusinfo>), which is hosted by the Office of Undergraduate Education. Make sure to visit this page to review and be aware of these university policies and resources.

### **Intellectual Property**

Students are prohibited from recording class activities (including class lectures, office hours, advising sessions, etc.), distributing class recordings, or posting class recordings. Materials created by the instructor for the course (syllabi, lectures and lecture notes, presentations, etc.) are copyrighted by the instructor. This university policy (S12-7) is in place to protect the privacy of students in the course, as well as to maintain academic integrity through reducing the instances of cheating. Unauthorized recording may violate university and state law. It is the responsibility of students that require special accommodations or assistive technology due to a disability to notify the instructor.

## SCED 205/Methods of Research, Spring 2022, Course Schedule

*Note: This schedule is subject to change with reasonable notice. Please review Canvas Modules for the most up-to-date information.*

### Course Schedule

| Week | Date | Topic  | Readings & Assignments Due  |
|------|------|--|---|
| 1    | 1/31 | Introduction, Research Proposal Overview   |   |
| 2    | 2/7  | Qualitative Method Highlight: Ethnography<br><br>Research Questions/Introduction to Qualitative Design and Methods | Readings<br><b>Due:</b> Discussion Board Week 2<br><b>Due:</b> Research Question Brainstorm & Development Assignment  |
| 3    | 2/14 | Qualitative Method Highlight: Case Study<br><br>Qualitative Research Method: Observation<br><br>Rigor & Validity   | Readings<br><b>Due:</b> Discussion Board Week 3<br><b>Due in class:</b> Discussion Leader 1   |
| 4    | 2/21 | Methods Highlight: Design Based Research<br><br>Validity in your project, Timelines                                | Readings<br><b>Due:</b> Discussion Board Week 4<br><b>Due:</b> Observation Practice Assignment<br><b>Due:</b> Research Question Assignment 2<br><b>Due in class:</b> Discussion Leader 2                |
| 5    | 2/28 | Methods Highlight: Teacher Action Research, Non-Experimental Projects<br><br>Ethics & IRB                          | Readings<br><b>Due:</b> Discussion Board Week 5<br><b>Due:</b> Timeline Assignment<br><b>Due:</b> Reflection on Validity in your Project Assignment<br><b>Due in class:</b> Discussion Leader 3         |
| 6    | 3/7  | Quantitative Methods Highlight: Experiments and Quasi- Experiments<br><br>Validity in your project                 | Readings<br><b>Due:</b> Discussion Board Week 6<br><b>Due in class:</b> Discussion Leader 4   |
| 7    | 3/14 | Survey Studies   | Readings<br><b>Due:</b> Meeting with Advisor Assignment<br><b>Due:</b> Discussion Board Week 7<br><b>Due in class:</b> Discussion Leader 5  |
| 8    | 3/21 | Collecting data: Interviewing, field notes, observations   | Readings<br><b>Due:</b> Proposal Draft 1a of Lit Review, Methods and Data Collection<br><b>Due:</b> Discussion Board Week 8<br><b>Due in class:</b> Discussion Leader(s) 6                              |
|      | 3/28 | <i>No class – Spring Break</i>   |   |
| 9    | 4/4  | Analyzing quantitative data: Descriptive Statistics, Correlation, Ordinary Least Squares Regression, T-tests       | Readings<br><b>Due:</b> IRB Draft 1 (application and consent forms only)<br><b>Due:</b> Peer review of proposal draft 1a<br><b>Due:</b> Observation Assignment 2<br><b>Due:</b> Discussion Board Week 9 |

|                       |            |  |  |
|-----------------------|------------|--|--|
|                       |            |  | <i>Due in class: Discussion Leader 7</i>   |
| 10                    | 4/11       | Analyzing qualitative data: coding, video and audio analysis | Readings<br><i>Due: Draft 1 of full proposal, including creation or identification of data instruments (e.g. surveys or interview protocols)</i><br><i>Due: Interview and Interview Reflection</i><br><i>Due: Discussion Board Week 10</i><br><i>Due in class: Discussion Leader 8</i> |
| 11                    | 4/18       | Peer Reviewing   | <i>Due: Peer Review of full proposal draft</i><br><i>Due: Peer Review of IRB draft 1</i><br><i>Due: Coding and Coding Reflection</i><br><i>Due in class: Peer Review Assignment</i>  |
| 12                    | 4/25       | Ethics and IRB   | Reading<br><i>Due: Full Proposal Draft 2</i><br><i>Due: Discussion Board Week 12</i>   |
| 13                    | 5/2        | Focus on Mixed Methodologies                                 | Readings<br><i>Due: Peer review of proposal draft 2</i><br><i>Due: Discussion Board Week 13</i><br><i>Due in class: Discussion Leader 9</i>  |
| 14                    | 5/9        | IRB Help & Workday   | <i>Due: IRB Final Draft (application, all consent forms, and data instruments-surveys and/or interview protocols)</i><br><i>Due in class: IRB Status and Help Discussion Board</i>   |
| 15                    | 5/16       | Final Presentations  | <i>Due: Final Presentation Slides due by 4:00PM</i><br><i>Due: Proposal Final draft</i><br><i>Due in class: Final Presentation</i>   |
| Final Evaluation Date | Thur. 5/19 |  | <i>Due: Final IRB Submitted</i>  |

C&M refers to the volume Cohen, Manion, & Morrison (2011) *Research Methods in Education*; GC&E refers to Green, Camili & Elmore (2006) *Complementary Methods in Research Education*.

### Suggested Supplemental Readings (Optional)

Alghamdi, A. H., & Li, L. Adapting Design-Based Research as a Research Methodology in Educational Settings. *International Journal of Education and Research*, 1(10)

Bell, P., Hoadley, C. M., & Linn, M. C. (2004). Design-based research in education. In M. C. Linn, E. A. Davis, & P. Bell (Eds.), *Internet environments for science education* (pp. 73–84). Mahwah, NJ: Lawrence Erlbaum

Creswell, J. W. (2013). *Research design: Qualitative, quantitative, and mixed methods approaches*. Sage. (Chapter 14 - Ethnographic designs p. 461-500)

Hatch, J. A. (2002). *Doing qualitative research in education settings*. SUNY Press. (Chapter 2 – Designing Qualitative Studies p. 37-70).

Hatch, J. A. (2002). *Doing qualitative research in education settings*. SUNY Press. (Chapter 3 – Collecting Qualitative Data p. 71-146)

Merriam, S. B. (2014). *Qualitative research: A guide to design and implementation*. John Wiley & Sons. (Chapters 1-2 – The design of qualitative research p. 1-38).

Merriam, S. B. (2014). *Qualitative research: A guide to design and implementation*. John Wiley & Sons. (Part 2 – Collecting Qualitative Data p. 85-164).

Merriam, S. B. (2014). *Qualitative research: A guide to design and implementation*. John Wiley & Sons. (Chapter 8 – Qualitative Data Analysis p. 169-207).

Green, J. L., Camilli, G., & Elmore, P. B. (Eds.). (2012). *Handbook of complementary methods in education research*. Routledge. (Chapter 33 – Randomized Experiments in Educational Research p 551-565)

Green, J. L., Camilli, G., & Elmore, P. B. (Eds.). (2012). *Handbook of complementary methods in education research*. Routledge. (Chapter 21 – Interviewing in educational research p. 357-370)

Green, J. L., Camilli, G., & Elmore, P. B. (Eds.). (2012). *Handbook of complementary methods in education research*. Routledge. (Chapter 27 – Multiple Methodologies in Education Research p. 457-476)

Mertens, D. M. (2014). *Research and evaluation in education and psychology*. Sage. (Chapter 8 – Qualitative Methods p. 225-265)