SEPAL
The Science Education Partnership & Assessment Lab
San Francisco State University

Biol/Sci 750: Science Teaching for Scientists

An Introduction to Science Education, Pedagogy, and Partnership

Fall 2019, Fridays, 12:00 – 1:40pm
Hensill Hall 245, The SEPAL Classroom

*"Envision music schools that train pianists to play with their right hands, hoping the left hands will figure it out all on their own. As unthinkable as this may seem, it is not unlike the way research universities train scientists. Just as piano playing is a two-handed job, so is the mission of higher education: to generate **and** disseminate knowledge. Why, then, do we take preparation for one part of this endeavor so seriously and treat the other so casually?"*
– from "Scientific Teaching" by Jo Handelsman, Sarah Miller, and Chris Pfund

"I have repeatedly argued that the future of science requires that scientists take their teaching just as seriously as they take their science. This will require that we use scientific evidence to test and improve the effectiveness."
– Bruce Alberts, *Professor of Biochemistry, UCSF; former President, National Academy of Sciences and Editor-in-Chief Science Magazine*

Instructors:	Kimberly D. Tanner, Ph.D. Professor of Biology; Director, SEPAL kdtanner@sfsu.edu; 415-405-3438	Sarah B. Pickett, Ph.D. Postdoctoral Scholar, SEPAL sbpickett@sfsu.edu
Office Hours:	Thursdays, 10 – 11 am Fridays, 9 – 10 am Any time by appointment!	Fridays, 2 – 3pm By appointment, just email me!

Course Credit: 2 units

Course Description: This course is designed to provide an introduction to practical teaching strategies, science education theory and research, and scientific teaching to SFSU graduate student scientists who are teaching science in a variety of contexts. Weekly course sessions will include both instructor-driven and student-driven discussions, activities, and presentations.

Course Goals and Student Learning Objectives:

Through their participation in the Bio/Sci 750 course, students will…

- build a community of student scientists who are iteratively improving their knowledge of and skills in teaching the science they know to others.
- explore and evaluate their current use of a variety of science teaching strategies that build their knowledge of active learning, assessment, and equitable teaching strategies.
- reflect on their current teaching practice, develop a Statement of Teaching Philosophy, peer review these statements written by their colleagues, and refine their own.
- develop a question about what is happening in their teaching context, collect evidence to gain insights, and share their results with others through poster presentations.
- videotape themselves teaching, review their tape, and share insights with colleagues.
- strategize about how to apply their knowledge of effective science teaching to other scientific professional activities such as research posters, presentations, and lab meetings.

Course Requirements:

- Attend weekly course sessions on Fridays 12:00 – 1:40 pm! Please be on time…
- Come prepared for class with binder and notebook for taking notes and recording observations.
- Prepare in a scholarly manner for each weekly course session by completing readings, collecting evidence in your teaching context, leading and/or facilitating discussions, and writing reflections.
- Submit a weekly Scientist Reflective Journal entry through iLearn that is more than 300 words and on time, submitted before noon the Thursday before class.
- Schedule a teaching/presentation observation session at some point during the semester, and meet with the instructor to debrief.
- Have a Bio/Sci 750 colleague visit, observe, and videotape one of your teaching sessions or presentations, and do the same for them. Prepare to share a video excerpt with colleagues.
- Develop and revise a Statement of Teaching Philosophy for future professional use.
- Develop a classroom evidence collection project proposal, implement your plan, and share your data and insights through a scientific poster session.
- Actively participate and be a supportive colleague in all group activities such as journal club discussions, peer review sessions, and poster sessions.

iLearn:
Assignments, class agendas, and class handouts will be posted on iLearn (ilearn.sfsu.edu). Access to iLearn is required for the course.

Course Components/Grading Scheme: *Attendance and class participation are essential! If you must miss a class, please notify the instructors in advance.*

COURSE COMPONENT	% OF GRADE
Reflection	
Weekly Reflections (14 @ 10 points each)	**20%**
Participation	
Weekly Attendance and Participation (14 @ 10 points each)	**20%**
Teaching Coaching Session (schedule, participate, reflect)	**10%**
Class Projects	
V^2 Project: Visiting and Videotaping	**15%**
Statement of Teaching Philosophy	**10%**
Classroom Evidence Collection Project	**15%**
Final Semester Reflection	**10%**
TOTAL	**100%**

Course Topic Sequence and Timeline

(This schedule is approximate and absolutely subject to change!)

Class #1 **August 30**	***Welcome! Who are we? What does it mean to learn? How do students experience science teaching?*** • Keeping Your Eye on the Big Picture: Exploring what it means to learn and exploring scientific teaching • Bio/Sci 750: It's about being a better scientist; it's not just about teaching.
Class #2 **September 6**	***How do I decide what to do with students during class? How do I plan a lesson? What strategies can I use to promote student success?*** • The 5-E Model: Scientific approaches to lesson planning
Class #3 **September 13**	***How can we promote inclusivity in classrooms? In lessons?*** • Twenty-one practical equity strategies for the science classroom • The invisible barrier of Instructor Talk
Class #4 **September 20**	***What is it like to implement scientific teaching strategies?*** • Scientist Spotlights: integrating inclusive curricula into class sessions • Poster session to share about a strategy or strategies you have implemented so far
Class #5 **September 27**	***How do we reveal student thinking about complex ideas through assessment? How can student ideas guide our teaching?*** • Exploring The Montillation of Traxoline • Learning practical assessment strategies for the science classroom • Lessons from Thin Air: Using conceptions and misconceptions in science teaching
Class #6 **October 4**	***How can we incorporate assessment into every class session? How can we write effective assessment questions to gauge student learning?*** • Assessment in 1, 5, 10, and 20 Minutes • Delving into Bloom's Taxonomy and question design • Revisiting the Radish Experiment and sharing results from the misconception hunt
Class #7 **October 11**	***How can we engage diverse student populations and promote active participation?*** • Defining and thinking about equity in your teaching: Mobiles
Class #8 **October 18**	***How can we promote fairness in classrooms? How does fairness influence learning?*** • Journal club discussions – Bias, Deficit Models, and Stereotype Threat
Class #9 **October 25**	***How can we retain more students in the sciences? How can we collect evidence about what's going on in our classrooms?*** • Revisiting the twenty-one practical equity strategies for the science classroom • Preparing to craft classroom evidence collection proposals
Class #10 **November 1**	***Wild Card!*** • V^2 Project – Visiting and Videotaping – Final Week!
Class #11 **November 8**	***How can we improve our classroom evidence collection proposals through peer review?*** • Peer review panels on classroom evidence collection proposals
Class #12 **November 15**	***What did we learn from videotaping our own teaching?*** • Excerpts of Classroom Videotapes – Presentations
Class #13 **November 22**	***What are our new professional goals for continually improving as scientist educators?*** • Peer Review of Statements of Teaching Philosophy
November 29	**NO CLASS –** ***Fall Break!***
Class #14 **December 6**	***What does collecting evidence in our classroom reveal?*** • Poster Session on Classroom Evidence Collection Project

Class #15	***What have we learned about science teaching? How could this course be improved?***
December 13	• Making Bio/Sci 750 Better: Carousel Graffiti

Disability access: Students with disabilities who need reasonable accommodations are encouraged to contact the instructor. The Disability Programs and Resource Center (DPRC) is available to facilitate the reasonable accommodations process. The DPRC is located in the Student Service Building and can be reached by telephone (voice/TTY 415-338-2472) or by email (dprc@sfsu.edu)." (http://www.sfsu.edu/~dprc).

Policy on observance of religious holidays: The faculty of San Francisco State University shall make reasonable accommodations for students to observe religious holidays when such observances require students to be absent from class activities. It is the responsibility of the student to inform the instructor, *in writing*, about such holidays during the first two weeks of the class each semester. If such holidays occur during the first two weeks of the semester, the student must notify the instructor, in writing, at least three days before the date that he/ she will be absent. It is the responsibility of the instructor to make every reasonable effort to honor the student request without penalty, and of the student to make up the work missed. (*SFSU Policy F00-212*).

Statement on plagiarism and cheating: Students are expected to maintain academic integrity in all work pursued at San Francisco State University. Cheating on tests may, at the discretion of the instructor, result in the automatic disqualification of the test and the student receiving zero points for that test. Cell phone use (text messaging included) during a test for *any* reason (personal or otherwise) is considered cheating. Plagiarism, defined as either ***1) direct copying or loose paraphrasing of text from a published work or from an online source without appropriate referencing, or 2) use of another student's work or ideas without appropriate attribution***, will result in zero points earned for that assignment.

Student disclosures of sexual violence:
SF State fosters a campus free of sexual violence including sexual harassment, domestic violence, dating violence, stalking, and/or any form of sex or gender discrimination. If you disclose a personal experience as an SF State student, the course instructor is required to notify the Dean of Students. To disclose any such violence confidentially, contact:
The SAFE Place - (415) 338-2208; http://www.sfsu.edu/~safe_plc/
Counseling and Psychological Services Center - (415) 338-2208; http://psyservs.sfsu.edu/
For more information on your rights and available resources: http://titleix.sfsu.edu

Food and Housing Insecurity and Support:
Students experiencing economic hardships resulting in food insecurity, housing insecurity, or homelessness are encouraged to reach out to us or other faculty and staff members. SFSU has programs & resources in place to provide support with housing, food & other emergencies. Please reach out to us. We are eager to support all of you!

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Departmental and University Procedures and Deadlines:

Credit/No Credit Option: Students are responsible for choosing this option. The ***deadline to request credit/no credit grading is Monday, October 21, 2019***. The option cannot be reversed after the request.

Dropping a Course: The student is responsible for dropping via the WEB or Touch Tone until the ***last day to drop, Monday, September 16, 2019***.

Withdrawal from a Course: After the first two weeks of instruction, withdrawal from a course is not permitted except for serious and compelling reasons. If the withdrawal is approved, the student will receive a "W" grade. Requests for withdrawal are reviewed by the Instructor and Department Chair. Students must submit their unofficial transcripts along with their petitions. ***Last day to withdraw is, Tuesday, November 19, 2019***.

Withdrawal by Exception: Withdrawals ***beyond November 19, 2019 to December 16, 2019*** are only accepted in cases of verified accident or serious illness where the cause of withdrawal is due to circumstances clearly beyond the student's control and where the assignment of an incomplete is not practical. Ordinarily, withdrawals in this category involve a total withdrawal

from the University. All requests during this period must be reviewed by the Instructor, Department Chair, and Associate Dean. Students must submit their unofficial transcripts and appropriate documentations along with their petitions.