SCE 6416
Teaching Secondary School Biology & Chemistry
83733 000
Fall 2026

Instructor Name

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University Course Description

Effective use and production of instructional materials in the biological sciences. Interrelation of philosophy, materials, and classroom practices.

Course Requisites

Prerequisite(s):

Corequisite(s):

Student Learning Outcomes

By the end of this course, students will be able to:

1. Pedagogical Content Knowledge (PCK) & Standards Alignment

- **Apply** pedagogical content knowledge (PCK) to design and deliver effective biological and chemical science instruction.

- **Align** science lesson plans and learning objectives with the *Next Generation Science Standards (NGSS)* and the *Florida State Science Standards*.

2. Inquiry-Based Instruction & Sense-Making

- **Implement** inquiry-based and phenomenon-driven instructional strategies that facilitate student sense-making of core scientific concepts.
- **Construct** learning environments where students actively investigate natural phenomena rather than passively memorize facts.

3. Student Agency & Equity

- **Design** science lessons that actively promote student agency by integrating meaningful opportunities for student voice, choice, and collaborative decision-making.
- **Evaluate** classroom practices to ensure they foster an inclusive environment where all students are empowered to think like scientists.

4. Societal Connections & Socioscientific Literacy

- **Contextualize** science as a human endeavor by framing lessons around real-world personal and societal impacts.
- **Guide** K-12 students in leveraging scientific evidence to make sound, just, and ethically grounded decisions regarding socioscientific issues.

5. Reflective Practice & Professional Identity

- **Formulate** a personal science teaching philosophy statement that articulates self-awareness, professional aspirations, and a commitment to empowering diverse learners.
- **Critically reflect** on personal growth, confidence levels, and evolving pedagogical practices throughout the semester.

Course Objectives

By the end of this course, students will be able to:

1. Demonstrate pedagogical content knowledge (PCK) and practices for biological and chemical sciences.
2. Use inquiry-based and phenomenon-driven instructional strategies that engage students in making sense of core science concepts.
3. Design lessons that promote student agency by providing meaningful opportunities for voice, choice, and decision-making within the science classroom.
4. Connect science to self/society by framing it as a human endeavor and tool for making sound, just, and evidence-based decisions.
5. Build confidence and an understanding in teaching science concepts aligned with the Next Generation Science Standards (NGSS) and Florida State Science Standards.
6. Reflect on their own growth as a science educator by developing a teaching philosophy statement that demonstrates an awareness of self, aspirations, and a commitment to empowering science students.

Required Texts and/or Readings and Course Materials

Course readings will be provided by the instructor and selected by students.

Other important materials to be downloaded or familiar with include:

• Next Generation Science Standards: https://www.nextgenscience.org/

• The Framework for K-12 Science

Education: https://www.nextgenscience.org/framework-k-12-science-education

• The Khan Academy: https://www.khanacademy.org/

• CPALMS: www.cpalms.org

• Florida State Science

Standards: https://www.fldoe.org/academics/standards/subject-areas/math-science/science/

How to Succeed in this Course

Successful students should follow several practical tips prior to each class:

- Check Canvas and emails daily for announcements, updates, assignments, etc.
- Read all assigned documents prior to each class meeting, whether in-person or virtual.
- Come prepared to discuss the readings or assignments, apply the information, and collaborate with others in small groups as well as within whole class activities.
- Be present in all learning formats where discussions that will take place throughout the semester and thoroughly communicate ideas in these

spaces with your peers and colleagues.
- Manage your time wisely and ensure that all assignments reflect your best effort, collaboration, thoughtfulness, and are turned in on time.
- Communicate any challenges that you may be experiencing in a timely manner.

Grading Scale

I. Grading Scale

Grading Scale (Points)	
90-100	A
80 - 89	B
70 - 79	C
60 - 69	D
0 - 59	F

Grade Categories and Weights

Grading Scale

Assignment	**Points**
Discussion Posts (with peer responses)	
Introductions	10
Science Identity & Teaching Practices	10
The Role of Inquiry in Science	10
Inquiry & Phenomena in My Classroom	10
Science as a Human Endeavor	10
Connection Between Community & Classroom	10
Agency and Choice in Learning	10
Designing for Agency	10
Looking Forward as a Science Educator	10
Science Autobiography (with artifact)	15
Inquiry Lesson Plan and Demonstration	30
Place-based Science Exploration	15
Final: Science Photonarrative & Teaching Philosophy	50
Total	**200**

Major Topics and Course Schedule

Course Schedule

Week 1	**Introductions**	To help build our classroom community, we will learn a little bit about one another. Share your background, experiences, and goals, so we can begin to establish connections and common themes. Please include the following in your post: (1) Your Name; (2) Your Current Role (student, teacher, professional, etc.); (3) Your Area of Study; (4) Experiences in science and/or science education; (5) What are you looking forward to in this course?

		(6) One thing you would like me and/or your classmates to know about you (science-related or not, interesting fact, interests, or hobbies). You can add photos or videos to help us get to know you.

Week 3: Science Identity & Teaching Practices	Science Identity & Teaching Practices	Reflect on your science autobiography and/or from the resources about science identity. Include that as evidence but feel free to pull from other sources such as peer reviewed journal articles to add to the robustness of your post. Consider the following: (1) What themes emerged about your relationship with science? (2) How might your past experiences influence your pedagogical choices? Include a visual (photo, image, or drawing) to

		support your reflection.

Week 4:	The Role of Inquiry in Science	Inquiry-based and phenomenon-driven instruction are one of many ways to help students learn and engage with science. Reflect on your current understanding of inquiry and explore its role in engaging students with science. Discuss the following: (1) How do you define inquiry-based science teaching? (2) What is the difference between “hands-on” and true inquiry learning? (3) Share one real-world phenomenon (biology and/or

		chemistry related) you think would anchor an engaging science unit.

Week 5	Inquiry & Phenomena in My Classroom	Reflect on your inquiry-based lesson plan or on the resources about science inquiry. Include that as evidence but feel free to pull from other sources such as peer reviewed journal articles to add to the robustness of your post. Consider the following: (1) What are the benefits and challenges of using inquiry-based and/or phenomena driven teaching in the classroom? (2) How does inquiry/phenomena spark curiosity and engagement? (3) How can

		you use phenomena and inquiry to structure a science unit? Include a visual (photo, image, or drawing) to support your reflection.

Week 6	Science as a Human Endeavor	Science is shaped by cultural, political, and ethical contexts. Consider your thoughts around science as a human enterprise and reflect on how you might bring those dimensions into your classroom. Consider the following: (1) How is science influenced by culture, history, and politics? (2) What is your experience or thoughts regarding the relationship

		between science, self, and society. (3) Why is it important for students to connect science to their lived experiences and communities?

Week 8	Connection Between Community & Classroom	Reflect on your place-based learning assignment or on the place-based learning resources. Include that as evidence but feel free to pull from other sources such as peer reviewed journal articles to add to the robustness of your post. Consider the following: (1) What is the role of science in society and to self? (2) How does connecting science to the real-

		world help students to become evidence-based decision makers? (3) In what ways, can community-based visits become authentic entry points for teaching science? Include a visual to support your reflection (picture must be different than the picture used in your place-based learning assignment) .

Week 10	Agency and Choice in Learning	Student agency is the foundation of meaningful and lasting science learning. Define what agency looks like in the classroom and reflect on strategies that empower students to take ownership of their learning. Consider the following: (1) What does “student agency” mean to you? (2) Share an example of

		a learning environment where you had voice and choice in the classroom. What made it effective or ineffective? (3) How might increasing student ownership impact engagement in science?

Week 12	Designing for Agency	Reflect on the resources about student agency in science learning. Consider the following: (1) How do lessons that emphasize student voice and choice differ from traditional instruction? (2) What strategies will you use to encourage ownership of learning in your classroom? (3) How can designing for agency help foster motivation, curiosity,

		and long-term interest in science? (4) What were the benefits of analyzing and critiquing lessons with your peers? Include a visual (photo, image, or drawing) to support your reflection.

Week 13	Looking Forward as a Science Educator	Reflect on your pedagogical and/or personal growth as a science educator this semester. Respond to the following: (1) How have you grown as a science educator this semester? (2) What aspects of your science identity have changed or deepened? (3) What commitments will guide your teaching practices going

		forward? Include a visual (photo, image, or drawing) to support your reflection.

USF Core Syllabus Policies

USF has a set of central policies related to student recording class sessions, academic integrity and grievances, student accessibility services, academic disruption, religious observances, academic continuity, food insecurity, pregnancy and related conditions, and sexual harassment that **apply to all courses at USF**. Be sure to review these online:

https://www.usf.edu/provost/faculty-success/resources-policies-forms/core-syllabus-policy-statements.aspx

Student Recordings

Florida Statute 1004.097 Free Expression on Campus
Students may, without prior notice, record video or audio of a class lecture for a class in which the student is enrolled for their own personal, educational use (USF Policy 10-048). A class lecture is defined as a formal or methodical oral presentation as part of a university course intended to present information or teach enrolled students about a particular subject. Recording class activities other than class lectures, including but not limited to lab sessions, student presentations (whether individually or part of a group), class discussion, clinical presentations such as patient history, academic exercises involving student participation, test or examination administrations, field trips, private conversations between students in the class or between a student and the faculty member is prohibited. Recordings may not be used as a substitute for class participation

and class attendance and may not be published or shared without the written consent of the faculty member. Failure to adhere to these requirements may constitute a violation of the USF Student Conduct Code.

Course Policies: Grades

Attendance Policy: Because this is a participation-dependent course, excessive absences from in-person/synchronous class meetings (TWO or more) will result in substantial portions of the course expectations not being fulfilled and will result in a failing grade. Students are expected to attend classes. However, there may be times when a student must miss a class meeting due to extenuating circumstances. There are two types of extenuating circumstances: scheduled and unscheduled. Acceptable reasons for scheduled absences include observation of religious holy days, court-imposed legal obligations (e.g., jury duty and subpoenas), special requirements of university-sponsored events (e.g., performances, athletic events, judging trips), and requirements of military service. Employment schedules, athletic training, practice schedules, and personal appointments are not valid reasons for scheduled absences. In the case of scheduled absences, the student should notify the instructor at the beginning of the semester. Unscheduled absences involve unforeseen emergencies such as illness, injury, hospitalization, deaths in the immediate family, consequences of severe weather, and other crises. Students should not attend class if they are ill, particularly if they have fever and/or gastrointestinal symptoms and/or respiratory symptoms such as sneezing, runny nose, sore throat, or coughing. Students experiencing any of these symptoms should immediately contact the Student Health Services (813-974 2331) on the Sarasota-Mantatee and Tampa campus or the Wellness Center (727-873-4422) on the St. Petersburg campus for appropriate medical guidance and to obtain a verification of care letter. Students may turn to other health providers as well. Whether an absence is scheduled or unscheduled, arranging to make up missed work is the student's responsibility. The student is responsible for carefully reviewing all course materials posted on Canvas and checking in with classmates to obtain class notes and information.

Late Work Policy: All assignments must be uploaded to Canvas by the due date/time indicated in this syllabus unless otherwise approved by the instructor beforehand. Assignments that are late for any reason will have a 10% deduction of the total points for each late day (24-hour cycle), and late assignments will not be accepted more than three days past the original due date unless approval was provided in writing by the instructor prior to the due date. Assignments may not be revised for resubmission after the due date (unless otherwise specified).

Extra Credit Policy: There are no extra credit assignments in this course.

Grades of "Incomplete"

An Incomplete grade ("I") is exceptional and granted at the instructor's discretion only when students are unable to complete course requirements due to illness or other circumstances beyond their control. The course instructor and student must complete and sign the "I" Grade Contract Form that describes the work to be completed, the date it is due, and the grade the student would earn factoring in a zero for all incomplete assignments. The due date can be negotiated and extended by student/instructor as long as it does not exceed two semesters for undergraduate courses and one semester for graduate courses from the original date grades were due for that course. An "I" grade not cleared within the two semesters for undergraduate courses and one semester for graduate courses (including summer semester) will revert to the grade noted on the contract.

Campus Free Expression

It is fundamental to the University of South Florida's mission to support an environment where divergent ideas, theories, and philosophies can be openly exchanged and critically evaluated. Consistent with these principles, this course may involve discussion of ideas that you find uncomfortable, disagreeable, or even offensive.

In the instructional setting, ideas are intended to be presented in an objective manner and not as an endorsement of what you should personally believe. "Objective" means that the idea(s) presented can be tested by critical peer review and rigorous debate, and that the idea(s) is supported by credible research.

In this course you may be asked to engage with complex ideas and to demonstrate an understanding of the ideas. Understanding and engaging with an idea does not require you to believe it or to agree with it.

Course Policies: Technology and Media

Generative AI Tools

The purpose of this policy is to foster a dynamic learning environment that encourages technological adaptation, innovative thinking, and the ethical use of AI resources in academic endeavors.

1. Definition of Generative AI Tools: Generative AI tools refer to any artificial intelligence-powered software, program or application that can generate content, including but not limited to text, visuals, music, and other creative outputs. Examples of these tools include AI text generators, AI content rewriters, AI graphic generators, etc. Permitted Use: The use of generative AI tools is permitted for course-related submissions, including assignments. Generative AI tools are not to be used on program-wide projects. However, students must responsibly use these tools, adhering to the guidelines outlined in this policy. Student Responsibility: Students are responsible for appropriately using generative AI tools in their work. This includes: a) Citing all AI-generated content used in their submissions; b) Demonstrating a deep understanding of the subject matter, not solely relying on AI-generated content; c) Cross-reference claims and statements with original sources and providing appropriate citations are expected; d) Using AI tools as a supplemental resource (i.e., as an editor), not as the primary means of completing assignments; and e) Understanding that generative AI tools, while powerful, are not infallible and can produce misinformation

or inaccurate results. Students are responsible for the accuracy of their submissions and must cross-verify the information produced by these tools with reliable sources.

1. Violation Consequences: Misuse of AI tools, including use of AI that undermines the student learning objectives of the course or assignment, failing to cite AI-generated content, relying too heavily on AI for work completion or submitting inaccurate information generated by AI tools, will be subject to academic penalties. Consequences may range from a reduction in an individual assignment grade to larger academic sanctions per USF policy, depending on the severity of the violation (USF Regulation 3.027).
2. Exceptions: If there are specific assignments where the use of AI tools is not appropriate, these will be clearly marked in the assignment guidelines.

Students must adhere to these specific instructions.

3. Questions and Clarifications: If you are unsure whether a tool they wish to use qualifies as a generative AI tool, or have questions regarding the allowable use of such tools, please consult with the course instructor before using it.

Turnitin.com: In this course, turnitin.com may be utilized. Turnitin is an automated system that instructors may use to quickly and easily compare each student's assignment with billions of websites, as well as an enormous database of student papers that grows with each submission. For a more detailed look at this process visit http://www.turnitin.com.

Course Policies: Student Expectations

Health and Wellness

Your health is a priority at the University of South Florida. We encourage members of our community to look out for each other and to reach out for help if someone is in need. If you or someone you know is in distress, please make a referral at www.usf.edu/sos so that the Student Outreach & Support can contact and provide helpful resources to the student in distress. A 24-hour licensed mental healthcare professional, offered through the counseling center, is available by phone at 813-974-2831, option 3. Please remember that asking for help is a sign of strength. In case of emergency, please dial 9-1-1.

Title IX Policy

USF is committed to fostering a safe and respectful learning environment, free from sex discrimination and sexual harassment, in accordance with Title IX and USF Policy 0-004. If a student shares an experience of sexual harassment, sexual assault, stalking, or relationship violence with a USF employee (including faculty), that employee will notify the Title IX Office. This allows the Title IX Office to send the student an email with information about support resources and options—if it is safe to do so. Students are not required to respond to this email. The Title IX Office is a private resource. Information is shared only on a need-to-know basis to provide students with support measures. To speak to a confidential resource, students may contact USF Center for Victim Advocacy at

813-974-5757. Confidential resources do not notify the Title IX Office unless the student requests it. For more information about Title IX, available resources, or to make a report, please visit www.usf.edu/title-ix.

Course Hero / Chegg Policy

The USF Policy on Academic Integrity specifies that students may not use websites that enable cheating, such as by uploading or downloading material for this purpose. This does apply specifically to Chegg.com and CourseHero.com – almost any use of these websites (including uploading proprietary materials) constitutes a violation of the academic integrity policy.

Professionalism Policy

Per university policy and classroom etiquette; mobile phones, iPods, etc. must be silenced during all classroom and lab lectures. Those not heeding this rule will be asked to leave the classroom/lab immediately so as to not disrupt the learning environment. Please arrive on time for all class meetings. Students who habitually disturb the class by talking, arriving late, etc., and have been warned may suffer a reduction in their final class grade.

Turnitin.com

In this course, turnitin.com may be utilized. Turnitin is an automated system which instructors may use to quickly and easily compare each student's assignment with billions of web sites, as well as an enormous database of student papers that grows with each submission. Accordingly, you may be expected to submit all assignments in both hard copy and electronic format. After the assignment is processed, as instructor I receive a report from turnitin.com that states if and how another author's work was used in the assignment. For a more detailed look at this process visit http://www.turnitin.com.

Netiquette Guidelines

- Act professionally in the way you communicate. Treat your instructors and peers with respect, the same way you would do in a face-to-face

environment. Respect other people's ideas and be constructive when explaining your views about points you may not agree with.
- Be sensitive. Be respectful and sensitive when sharing your ideas and opinions. There will be people in your class with different linguistic backgrounds, political and religious beliefs or other general differences.
- Proofread and check spelling. Doing this before sending an email or posting a thread on a discussion board will allow you to make sure your message is clear and thoughtful. Avoid the use of all capital letters, it can be perceived as if you are shouting, and it is more difficult to read.
- Keep your communications focused and stay on topic. Complete your ideas before changing the subject. By keeping the message on focus you allow the readers to easily get your idea or answers they are looking for.
- Be clear with your message. Avoid using humor or sarcasm. Since people can't see your expressions or hear your tone of voice, meaning can be misinterpreted.

Email and Discussion Board Guidelines

- Use the subject line effectively by using a meaningful line of what your email or discussion is about.
- Keep your emails and postings related to the course content. You should not post anything personal on a discussion board unless it is requested by the instructor.
- Any personal, course or confidential issues should be directly communicated to the instructor via email. The discussion boards are public spaces; therefore, any issues should not be posted there.

End of Semester Student Evaluations

All classes at USF make use of an online system for students to provide feedback to the University regarding the course. These surveys will be made available at the end of the semester, and the University will notify you by email when the response window opens. Your participation is highly encouraged and valued.

Food and Drink Policy (for in-campus sessions only).

Please adhere to the firm policy of no beverages (other than bottled/capped water), food, tobacco products, or like items in the classroom. Your understanding of the necessity for this policy and cooperation will be greatly appreciated. This policy will be strictly enforced.

Learning Support and Campus Offices

Academic Accommodations

Students with disabilities are responsible for registering with Student Accessibility Services (SAS) in order to receive academic accommodations. For additional information about academic accommodations and resources, you can visit the SAS website.
SAS website for the Tampa campus and Sarasota-Manatee Teachout site.
SAS website for the St. Pete campus.

Academic Support Services

The USF Office of Student Success coordinates and promotes university-wide efforts to enhance undergraduate and graduate student success. For a comprehensive list of academic support services available to all USF students, please visit the Office of Student Success website.

Canvas Technical Support

If you have technical difficulties in Canvas, you can find access to the Canvas guides and video resources in the “Canvas Help” page on the homepage of your Canvas course. You can also contact the help desk by calling 813-974-1222 in Tampa or emailing help@usf.edu.
USF IT Services

Center for Victim Advocacy

The Center for Victim Advocacy empowers survivors of crime, violence, or abuse by promoting the restoration of decision making, by advocating for their rights, and by offering support and resources. Contact information is available online.

Counseling Center

The Counseling Center promotes the wellbeing of the campus community by providing culturally sensitive counseling, consultation, prevention, and training

that enhances student academic and personal success. Contact information is available online.
Counseling Center website for the Tampa campus and Sarasota-Manatee Teachout site.
Counseling Center website for the St. Pete campus.

Tutoring

The Tutoring Hub offers free tutoring in several subjects to USF undergraduates. Appointments are recommended, but not required. For more information, email asctampa@usf.edu.
Tutoring website for the Tampa campus and Sarasota-Manatee Teachout site.
Tutoring website for the St. Pete campus.

Writing Studio

The Writing Studio is a free resource for USF undergraduate and graduate students. At the Writing Studio, a trained writing consultant will work individually with you, at any point in the writing process from brainstorming to editing. Appointments are recommended, but not required. For more information or to make an appointment, email: writingstudio@usf.edu.
Writing studio website for the Tampa campus and Sarasota-Manatee Teachout Site.
Writing studio website for the St. Pete campus.

Student Ombuds Office

Florida Statute 1006.51 and Florida Board of Governors Regulation 6.011 require that all public institutions provide ombuds services to students. The Student Ombuds Office at USF is a confidential, impartial, informal, and independent resource for students experiencing challenges related to the university. Ombuds can help students safely explore options, clarify processes, and consider next steps. Learn more or make an appointment at usf.edu/student-ombuds.