LEWIS & CLARK COLLEGE
GRADUATE SCHOOL OF EDUCATION AND COUNSELING
SECONDARY TEACHER EDUCATION

SCI 579 - TEACHING SCIENCE TO ADOLESCENTS

2025 FALL TERM

4 CREDITS

Course Instructor: Alfonso Garcia Arriola, Ed.D.
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Office & Hours: By arrangement
Classroom: Rogers 108
Class Meeting Schedule: Mondays and Wednesdays 4:30 – 7:00 pm

*"You can't mandate learning, but you can create the **conditions** in which people are **inspired** and **empowered** to **learn**." -Katie Martin*

CATALOG DESCRIPTION

Teaching and learning science in middle-level and high school classrooms. Emphasizes the design of investigations, safety, and the role of using a wide variety of science activities in science teaching. Includes planning, organization, and assessment of science teaching and learning, using the tenets of backward design. Pays attention to differentiation of instruction for student needs, articulation of objectives, and their link to teaching, standards, and assessment. Introduces participants to the importance of science as the work of a particular cultural community with shared values and linguistic norms, while examining literature about the challenge students may face in making a "cultural border crossing" into science. Special attention is given to diversity and social justice issues. Materials draw upon research from the history and philosophy of science as well as research about the psychology of learning science, with particular attention to the "human constructivist" views and adolescent development.

COURSE STRUCTURE AND GOALS

Over the course of the next year, you will be learning how to teach science in ways that honor the needs, interests, and experiences of all your students. In this class, you will learn how to plan for and implement engaging and responsive science teaching and assessment through activities, readings, discussions, and reflection. You will design lessons and units, have opportunities to try out your ideas in class and with your own students, and, based on your own reflection and the feedback of others, revise and refine your plans and teaching. Some of this work may require you to rethink your assumptions about what it means to teach, about who should learn science, and what science they should learn. The primary goal of this course is to prepare you to be a successful beginning science teacher for middle and high school students, with the long-term goal of providing a foundation for your ongoing development as a science educator.

You will:

- develop and articulate a philosophy of science teaching that supports the learning of all of your students;
- learn about the Next Generation Science Standards (NGSS);
- learn to plan engaging and responsive units and lessons using a backwards design process;
- learn to develop and use formative and summative assessments and to use data from those assessments to make informed decisions about planning for instruction;
- learn to apply instruction strategies to support the learning of diverse students;
- learn to connect science content to local, regional, and global issues;
- learn to use technology in ways that support your instructional goals.

REQUIRED MATERIALS

science notebook (provided)

Windschitl, M., Thompson, J., & Braaten, M. (2018). Ambitious Science Teaching. Cambridge, MA: Harvard Education Press. (AST)*

Tomlinson, C. & McTighe, J. (2006). Integrating Differentiated Instruction and Understanding by Design. Alexandria, VA: ASCD. (T&M)*

Fritzgerald, A. (2020). Antiracism and universal design for learning: Building expressways to success. CAST Professional Publishing.

Hagopian, J., Watson, D., & Au, W. (2018). Teaching for Black Lives. Milwaukie, WI: Rethinking Schools (T4BL)

Srinivasan, Meena (2019). SEL Every Day. New York, NY: W. W. Norton & Co.

Secondary MAT Program Handbook (2023)

*These books are also available online at Watzek Library. We will use these books all year; please do not sell them! Other readings as assigned will be linked in this syllabus and posted on the course Moodle site.

RECOMMENDED MEMBERSHIPS AND SUBSCRIPTIONS

National Science Teachers Association (https://www.nsta.org/)
Oregon Science Teachers Association (https://oregonscience.org/)
Rethinking Schools (https://rethinkingschools.org/)

COURSE EXPECTATIONS

attend all class sessions (contact me if you need to miss a session)
participate actively in all class sessions
prepare thoroughly for all class sessions
complete all assignments

EVALUATION AND GRADES

You will receive verbal or written feedback on all assignments. Some assignments will receive an evaluative grade (A, B, C, or no pass). These will help determine your final grade. You need a B- or higher to earn credit for this class.

To earn an A, you must complete and submit all assignments in a timely manner. The assignments must demonstrate thoughtful reading of texts, careful analysis, and synthesis of ideas. Ideas are conveyed clearly and supported with references to assigned and other relevant readings. Written assignments are carefully revised and proofread for strong organization, as well as correct spelling, grammar, and syntax. You must participate actively in class discussions by bringing ideas from both theory and practice to the conversation and listening carefully to others. You must complete and reflect on required readings. You attend all class sessions prepared to discuss the topics.

To earn a B, you complete all assignments, but they are turned in late. Written assignments may not reflect careful revision and/or proofreading leading to inadequate organization and minor grammatical or spelling errors. Your analysis and synthesis of ideas may be superficial, and ideas may not be conveyed or argued clearly or thoroughly. You participate sporadically in class discussions, or dominate discussions and don't listen well to others. You miss more than one or two class sessions.

To earn a C, you do not complete all assignments or submit them incomplete. Your assignments demonstrate little or no synthesis or analysis of texts and are sloppy with poor organization and multiple spelling and grammatical errors. You rarely participate in class discussions and frequently come to class unprepared to participate in class discussions and activities. You are absent from several class sessions.

Attendance Policy

Attendance is critical. Candidates are expected to attend all classes unless they are sick. If you are sick, notify the instructor early in the day, and submit the assigned make-up work after class. Candidates who miss more than two classes will need to meet with the instructor to develop a learning plan.

Course Required Grading Scale

- A 90-100%
- B 80-89%
- C 70-79%
- D 60-69%
- F 50-59%

Late Work Policy

If you need more time to complete an assignment because of extenuating circumstances, please contact me before the due date. If late submissions become a habit, we will work together to craft a professional organization plan for you. If you receive an email from me about missing work, please respond within 1 business/school day (M-F).

COURSE CALENDAR

WEEK	MONDAYS	WEDNESDAYS
1	**9.1.25 NO CLASS** LABOR DAY	**9.3.25** **FQ**: Who are we? How do we build community? Introducing the nature of science to students **TASKS**: develop community agreements and reflect on introductory science activities
2	**9.8.25** **FQ**: How do we get to know our students and develop relationships? What are the goals of science education? **TASKS**: Read and discuss A 4-Part System for Getting to Know Your Students? read Hodson 2014, Learning Science, Learning about Science, Doing Science: Different goals demand different learning methods	**9.10.25** **FQ:** Overview of best practices in science teaching **TASKS**: Read ODE Science Learning Best Practice Guide
3	**9.15.25** **FQ:** What is Ambitious Science Teaching? **TASKS**: read Ambitious Science Teaching Chapter 1 (pages 1-18)	**9.17.25** **FQ**: What really matters in teaching science? **TASKS**: read Ambitious Science Teaching Chapter 2 (pages 19-38)
4	**9.22.25** **FQ**: How does productive discourse support science learning? **TASKS**: read Ambitious Science Teaching Chapter 3 (pages 39-64)	**9.24.25** **FQ**: How do we support equitable student discourse? **TASKS**: read Ambitious Science Teaching Chapter 4 (pages 65-84)
5	**9.29.25** **FQ**: How do we center indigenous knowledge and experiences in science? **TASKS**: read Implementing Meaningful STEM Education with Indigenous Students & Families	**10.1.25** **FQ**: How do we figure out what students already know? **TASKS**: read Ambitious Science Teaching Chapter 5 (pages 85-109)
6	**10.6.25** **FQ**: How do we make student thinking visible? **TASKS**: read Ambitious Science Teaching Chapter 6 (pages 111-130)	**10.8.25** **FQ**: How do we allow students to show what they know? **TASKS**: read Ambitious Science Teaching Chapter 7 (pages 131-150) **ASSIGNMENT**: Ambitious Science

		Teaching Performance Task
7	**10.13.25** **FQ**: How do we use backwards design to plan effective science units and lessons? **TASKS**: read or listen to a variety of resources about Understanding by Design in class	**10.15.25** **FQ**: How do we plan for and prepare for state science assessments? **TASKS**: read Understanding Science Interim Assessment.
8	**10.20.25** **FQ**: How do we intentionally plan effective science lessons for diverse learners? **TASKS**: watch What is UDL? Universal Design for Learning Explained (3 minutes) read UDL Guidelines	**10.22.25** **FQ**: How do we support literacy in science education? **TASKS**: read Oregon's Adolescent Literacy Framework (Read introduction, Section 1, and pgs. 125-137)
9	**10.27.25** **FQ**: How do we integrate science with other subjects? **TASKS**: read CONVERGENCE EDUCATION: A GUIDE TO TRANSDISCIPLINARY STEM LEARNING AND TEACHING	**10.29.25** **FQ**: How do we plan for formative assessments? **TASKS**: read 5 Conditions for Getting Formative Assessment Right, Using Skills to Grade Proficiency in Science
10	**11.3.25** **FQ**: How do we center equity in science classrooms? **TASKS**: read Teaching Social Justice in the Science Classroom	**11.5.25** **FQ**: How do we efficiently provide student feedback to students in science classrooms? **TASKS**: Read Getting Great at Feedback
11	**11.10.25** **TBD**	**11.12.25** **TBD**
12	**11.17.25** **TBD**	**11.19.25** **TBD**
13	**11.24.25 NO CLASS** **Parent Teacher Conferences**	**11.26.25 NO CLASS**
14		**12.3.25 MAIKA YEIGH** **FQ**: TBD **TASKS**: TBD
15		**12.10.25 MAIKA YEIGH** **FQ**: TBD **TASKS**: TBD

16		**12.17.25 MAIKA YEIGH** **FQ**: TBD **TASKS**: TBD

GSEC & Class Policies

This course adheres to the general policies outlined in the catalog and student handbook of the Lewis & Clark Graduate School of Education and Counseling. This includes full adherence to the following policies:

- Nondiscrimination: go.lclark.edu/gsec-nondiscrimination
- Standards for professional student conduct and academic integrity: go.lclark.edu/gsec-conduct
- Sexual misconduct: go.lclark.edu/titleIX

If you have any questions regarding these policies, please speak to your instructor for clarification.

Safe and Supportive Learning Environment

I want to ensure that this class provides a safe and accessible learning environment for each and every one of us. In this course, among other things, you will be challenged to think critically about the impact of cultural differences, which may include gender, race, ethnicity, socioeconomic status, physical and cognitive ability, sexuality and other forms of diversity on students' and teachers' experiences in schools. You are encouraged to actively participate in these discussions by asking difficult questions and sharing your ideas. Because all students may not share the same opinions on topics we discuss in this class, it is important that we remember to respect the opinions and ideas of others. Everyone is expected to show respect and courtesy for all members of this class at all times. If you have needs or concerns about the climate, curriculum, instruction, or assessment of this class please feel free to talk to me at any point in the semester.

Health and Safety

In order to create an environment that is both safe and conducive to learning, Lewis & Clark and the Graduate School have developed guidelines outlining health and safety expectations for all members of the LC Community. Please refer to the Health and Safety Expectations for all Community Members for details about these expectations. If you have any questions about this, please feel free to contact me.

Non-discriminatory & People-First Language

Students are expected to use non-discriminatory language at all times. Oral and written language and visual representations must not devalue, demean or exclude individuals or groups on the basis of gender, disability, culture, race, religion, sexual preference or age. In addition, we will all work together to use people-first language; our goal is to help one another use language as a tool for student empowerment.

Academic Professional Conduct

Academic honesty and integrity are core values at Lewis & Clark College. Adherence to the norms and ethics of professional conduct are part of this commitment. Members of the Graduate School community both require and expect one another to conduct themselves with honesty, integrity, and adherence to professional norms of behavior. Policies related to academic and professional conduct can be found in the Graduate Catalog: http://docs.lclark.edu/graduate/policyprocedures/academic/. Please review these policies carefully and understand them fully. If you have any questions, please let me know.

Disability Services Statement

If you have a disability that may impact your academic performance, you may request accommodations by submitting documentation to the Office of Student Accessibility in the Albany Quadrangle (Room 206; 503-768-7192; access@lclark.edu). After you have submitted documentation and filled out paperwork there for the current semester requesting accommodations, staff in that office will notify me of the accommodations for which you are

eligible. Once I hear from them, I will schedule an appointment with you to talk about how to ensure I am making appropriate accommodations to support your learning. Additionally, the College also provides counseling services and support. You can learn more about the broad range of mental health services available on campus at: www.lclark.edu/offices/counseling_service

Instructional Technology
We will be using a number of different platforms for our work. You can refer to this document about how to access support and tutorials for most of this software.

Citations
Whenever citation is required or needed for your work, please use APA style. If you need support with APA style, please visit the Purdue Online Writing Lab for APA (v.7). APA is the citation style used by graduate education programs throughout North America.

Use of ChatGPT or other AI
The instructor for this course is fully aware of the rise of AI intelligence and its implication for your personal learning and your work as a teacher. I am not completely against your use of AI in learning IF the context of its use facilitates YOUR intellectual growth. I am, however, opposed to students using it as an unethical tool (ie, having it write their assignments and essays). In the case that a student is suspected of violating academic integrity in the use of AI, I will proceed with the formal procedure as set out by Lewis & Clark Graduate School's Academic Integrity policies.

Trigger Warnings
In this class, we won't be using trigger warnings. Our goal is to cultivate an inclusive and classroom. Rather than relying on trigger warnings, we will focus on building a foundation of trust and community. By approaching sensitive topics as a community, we can collectively navigate these conversations with compassion and understanding. An environment of respect, empathy, and open-mindedness, will help us navigate personally challenging conversations together. As part of this approach, please remember that you have the freedom to take a moment. You may do so for example by leaving the classroom or taking a break if you feel overwhelmed or upset. Together, we will support one another through these discussions, fostering an environment that promotes growth and learning and preparing us to be teachers who do the same.