

Science Education in the Secondary Schools (SCED 324) Master Syllabus

Academic Term

Instructor Information*

Instructor:

Office:

Office Hours:

Meeting Time:

Phone:

Email:

Course Description*

According to the catalog, "Techniques and materials appropriate for teaching science at the secondary level. Demonstration and experiments for use in teaching."

Prerequisites*

Admission to the Teacher Education Program and a *sincere* desire to help others learn science.

Course Rationale*

The purpose of this course is to help you become an effective teacher of science in the secondary schools. This course supports the University motto "*By Teaching, We Learn*" by providing teaching and learning opportunities that lead to the development and refinement of effective science teaching skills. Science is a way of knowing and of understanding; in order to accomplish the goals of this course, you will spend a great deal of time engaged in discussion, thinking, and activities that relate to science teaching and learning. I believe that students learn most effectively by doing and by interacting with each other and their environment in ways that help them to construct their own knowledge. In this course you will learn how to facilitate this type of learning for others as well.

Course Materials*

Required:

- Course packet, *Science Education in the Secondary Schools*, CWU Bookstore
- Blackboard account with enrollment in SCED 324 (<http://courses.cwu.edu>)
- LiveText software (CWU Bookstore; also see <http://www.livetext.com>)
- Internet access to Washington State Essential Academic Learning Requirements for Science (OSPI at <http://www.k12.wa.us/CurriculumInstruct/Science/default.aspx>) and National Science Education Standards (<http://www.nap.edu/readingroom/books/nses/>)

Course Management and Assessment: Blackboard and LiveText*

Blackboard (<http://courses.cwu.edu>) provides a framework for and description of course activities, and makes the course syllabus, lecture notes, assignments, updated grades, and important announcements available 24 hours a day, 7 days a week. It is *your responsibility* to check Blackboard *daily* so that you are aware of any changes to the course. Before using Blackboard you have to activate your Netware account (if you haven't already) and make sure you are enrolled in the Science Education in the Secondary Schools course (course ID: SCED 324.01_W07). If you are not automatically enrolled in the SCED 324 course, go to <http://www.cwu.edu/~media/cwuonline/getstarted.html> and follow the instructions *exactly*.

LiveText will be used to construct your course projects including lesson and unit plans and assessments. To use LiveText you will need to access it via the web. The portfolio you create in this class will also be an artifact in your science teaching program portfolio. Admission to and continuation in the Teacher Education Program requires you to purchase LiveText. You must present "proof of purchase" to the Certification Office, Black 228.

Learning Objectives*

The objectives of this course are based on the National Science Education Standards for Teachers of science (<http://www.nap.edu/readingroom/books/nses/3.html>), the WA Competencies for science teaching (<http://www.k12.wa.us/certification/profed/competency.aspx>), and the CWU Center for Teaching and Learning standards (http://www.cwu.edu/~ectl/index_documents.html). The work you produce this quarter will provide evidence that demonstrates your progress toward meeting each standard. This work will be compiled into a professional science teaching portfolio. This course will give you considerable opportunity to develop knowledge, skills, and disposition that address these objectives and standards.

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Objective 1: Develop inquiry teaching knowledge, skills, and values

- Standards addressed: NSES-A; WA Comp...; CTL 1.1, 1.3

Objective 2: Use best practices to facilitate and guide inquiry experiences for secondary learners

- Standards addressed: NSES-B; WA Comp...; CTL 1.2

Objective 3: Design learning environments that support inquiry, collaboration, and increase relevance

- Standards addressed: NSES-D, E; WA Comp...; CTL 1.2

Objective 4: Assess and evaluate diverse student learning and teaching effectiveness

- Standards addressed: NSES-C; WA Comp...; CTL 1.4, 1.5

Objective 5: Engage in continual professional growth

- Standards addressed: NSES-C; WA Comp...; CTL 1.3, 1.4

Outcome(s)	Assessment	Standards
Demonstrate applied understanding of contemporary science teaching issues including <ul style="list-style-type: none"> Scientific literacy for all students Inquiry as a tool for effective science learning The importance of state and federal standards and performance indicators Methods used for testing and assessment Applied science teaching best-practices 	Bias Reduction, Small Group, Technology, Reform Plans, Inquiry Lesson, Demonstration, Portfolio	NSES-A, B, C, D; WA-Comp...; CTL 1.1, 1.4
Critically analyze and evaluate science teaching practice	Volunteer Journal, Bias Reduction, Small Group, Technology, Reform Plans, Portfolio	NSES-C; WA-Comp...; CTL 1.2, 1.3
Develop and teach a science lesson to secondary students using the <i>learning cycle</i> method	Inquiry Lesson, Teaching Practicum, Portfolio	NSES- A, B; WA-Comp...; CTL 1.1, 1.2
Adapt existing curricula and resources to age-appropriate lessons using <i>best teaching practices</i> by <ul style="list-style-type: none"> Researching curricula and resources related to specific WA EALR GLE and NSES benchmarks and adapting these materials to specific learning needs 	Inquiry Lesson, Demonstration, Portfolio	NSES- A, C; WA-Comp...; CTL 1.1, 1.2
Demonstrate effective questioning skills to guide students in hands-on exploration and develop critical thinking by <ul style="list-style-type: none"> Leading students from observations to experimental results to conclusions based on logic and evidence 	Teaching Practicum, Inquiry Lesson, Demonstration, Class Discussion, Portfolio	NSES- A, B; WA-Comp...; CTL 1.1, 1.2
Appropriately assess student learning by <ul style="list-style-type: none"> Developing and appropriately applying assessments that measure student learning outcomes relative to standards 	Inquiry Lesson, Teaching Practicum, Portfolio	NSES- C; WA-Comp...; CTL 1.1, 1.2
Use safe practices when teaching science by <ul style="list-style-type: none"> Being aware of safety when developing, presenting, and participating in science activities; Communicating appropriate safety precautions to students before they perform a science activity 	Demonstration, Inquiry Lesson, Teaching Practicum	NSES- C, D; WA-Comp...; CTL 1.1, 1.4
Integrate science lessons with other subjects by <ul style="list-style-type: none"> Developing a lesson that shows effective integration of science with other subjects 	Inquiry Lesson, Portfolio	NSES- D, E; WA-Comp...; CTL 1.1, 1.2
Show working knowledge of the NSES-T, WA	Portfolio, Inquiry Lesson	NSES- C; WA-Comp...;

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Science EALRs and GLEs by <ul style="list-style-type: none"> Aligning curricular materials to specific benchmarks 		CTL 1.1, 1.2
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Learning Performance Evaluation

Different people learn in different ways; some excel at taking exams while others do better with projects and group discussion. To accommodate different learning styles, this course will use a weighted performance-based evaluation system. Both formative and summative performance assessments will be used to determine your overall grade according to the table below. Each assignment is described in detail in Blackboard.

Assignment	Points
Teaching Portfolio	200
<ul style="list-style-type: none"> Teaching goals inventory, personal and professional goals 	30
<ul style="list-style-type: none"> Bias (35), collaboration (35), technology (30), reform (30) plans 	130
<ul style="list-style-type: none"> Teaching philosophy 	50
<ul style="list-style-type: none"> Portfolio reflection 	50
Science Demonstration	100
Volunteer Journal	50
Inquiry Lesson Plan	150
<ul style="list-style-type: none"> Written lesson reflection 	50
<ul style="list-style-type: none"> Practicum Evaluation Form 	50
In-class Work/Participation	40
Final Examination	100
Total	1000

Grading Scale and Performance Characteristics

100%-90% = A to A-, 89.9%-80% = B+ to B-, 79.9%-70% = C+ to C, 69.9%-60% = D+ to D-, and <59.9% = F. Please see the Central Washington University Catalog for the eligibility requirements for an incomplete (I).

Course Expectations and Policies

This course is not about *me* teaching *you* – it is about you making the deliberate and conscious decision to learn to be the most effective science teacher possible. My role is to help facilitate your development as a teaching professional, which I will do to the extent of my abilities. I am open to any suggestions about how the course could be changed or made better. My aim is to have an open, professional dialogue between us; if you have suggestions, specific problems, concerns, or questions please discuss these with me as they arise. Working together, we can have a meaningful impact on the quality of secondary science education.

In order to best facilitate your learning, my expectations are as follows:

- Think critically.** This course is designed to help you develop your critical thinking abilities; these life skills will help you to be an effective teacher of science because students who see you analyze, infer, evaluate, and make reasoned judgments will emulate the behaviors you model and become better learners.
- Change your expectations.** This course will take a lot of work from both you and I. If you have low learning expectations for this course, that is what you will achieve. Success in this course will require open-mindedness and effort (several hours of study time for each hour of class). Depending on your science background, you may need to spend more or less time studying. Please budget your time to accommodate the workload. By working together, we can accomplish significant and meaningful learning.
- Show enthusiasm.** Science is fun and exciting. Modeling enthusiasm for science will teach your students to appreciate and enjoy science. It is important to be enthusiastic so that students will be inspired to learn science as well as other subjects.
- Act professionally.** This course is part of your transition from student to professional educator. As such, I expect you to attend class, be on time, and help others. I will not accept late work unless you have documented reasons for your absence.
- Use common sense.** Don't cheat on assignments or exams. Don't plagiarize others' work (you'll get a zero and will face disciplinary action by the university). Don't expect credit if you turn assignments in late. If you have a problem that prohibits you from turning something in on time, let me know ahead of time if possible. In all instances, communicate with me so we can prevent problems.

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Typical characteristics of A-level performance in this course:

- Consistently outstanding in ability to learn science concepts and apply them creatively and thoughtfully to science teaching pedagogy.
- Begins and ends course with high expectations and performance.
- Does not procrastinate and takes time to consider the rigors necessary for high performance.
- Listens to, reads, and follows all directions.
- Thoroughly understands the science concepts of the Washington State science EALRs and GLEs and can express those concepts succinctly and eloquently in both verbal and written form.
- Succinctly and effectively expresses themselves when writing, using correct science terminology, correct spelling and grammar.
- Consistently on time, with above average participation and an ability to ask important questions.
- Clearly demonstrates openness to learning as much as possible to become a stronger teacher. Understands that developing science teaching skills requires considerable effort and takes proactive responsibility for understanding expectations ahead of time.
- Displays a positive attitude and takes responsibility for their learning.

Bibliographic References

- National Science Education Standards, National Research Council, National Academy Press, Washington D.C., 1996.
- Benchmarks for Science Literacy, American Association for the Advancement of Science, Oxford University Press, New York, 1993.
- Science for All Americans, American Association for the Advancement of Science, Oxford University Press, New York, 1990.
- Washington State Essential Learnings in Science, OSPI, 1998.
- Science Instruction in the Middle and Secondary Schools, 5th edition by Eugene Chiappetta and Thomas Koballa, Jr.
- Orlich, D. C., Harder, R. J., Callahan, R. C., Trevisan, M. S., & Brown, A. H. (2004). Teaching Strategies: A Guide to Effective Instruction (7th ed.). Boston, MA: Houghton Mifflin.

Americans with Disabilities Act (ADA) Policy*

Students who have special needs or disabilities that may affect their ability to access information and/or material presented in this course are encouraged to submit a copy of the 'Confirmation of Eligibility for Academic Adjustments' from the Disability Support Services office as soon as possible so adjustments can be made that best serve the learning needs of the student. Students without this form should contact the Disability Support Services office in Bouillon 205 at 963-2171 or dssrecept@cwu.edu.

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Tentative Course Schedule

Tuesday	Thursday
<p style="text-align: right;">1/2</p> <p><u>Topics</u></p> <ul style="list-style-type: none"> • No class 	<p style="text-align: right;">1/4</p> <p><u>Topics</u></p> <ul style="list-style-type: none"> • Introductions, Syllabus, Bb and LiveText • CT, Nature of Science, Scientific Literacy <p><u>Reading</u></p> <p><i>Critical Thinking:</i></p> <ul style="list-style-type: none"> • Facione article (Bb CT folder) • Nelson article (course pack pg 1-18) <p><i>Nature of Science:</i></p> <ul style="list-style-type: none"> • Project 2061 Chapter 1 (Bb NOS folder) • Steen article (Bb SL folder) • Bybee article (course pack pg 19-24) • Hinman article (course pack pg 25-27) • Eisenhart article (Bb SL folder) <p>Due</p> <ul style="list-style-type: none"> • Teaching Goals Inventory (Blackboard) http://fm.iowa.uiowa.edu/fmi/xsl/tgi/data_entry.xsl?-db=tgi_data&-lay=Layout01&-view
<p style="text-align: right;">1/9</p> <p><u>Topics</u></p> <ul style="list-style-type: none"> • Critical Thinking, Scientific Literacy • State and National Science Standards • Testing and Student Achievement <p><u>Reading</u></p> <ul style="list-style-type: none"> • NSES website: http://www.nap.edu/readingroom/books/nses/overview.html • Orlich articles (Bb Testing, Performance folder) • Orlich article (course pack pg 28-29) • ACT Report (Bb Performance folder) • Achieve.org Report (Bb Performance folder) <p>Due</p> <ul style="list-style-type: none"> • 5 Personal and 5 Professional Goals (LiveText) 	<p style="text-align: right;">1/11</p> <p><u>Topics</u></p> <ul style="list-style-type: none"> • Constructivism and Objectivism • Bias and Science <p><u>Reading</u></p> <ul style="list-style-type: none"> • Rodriquez article (course pack pg 31-64) • Murphy website: http://www.mun.ca/educ/faculty/mwatch/fall02/Murphy.htm • PSU website: http://www.personal.psu.edu/users/t/x/tx1166/kb/theory/obj_con.html
<p style="text-align: right;">1/16</p> <p><u>Topics</u></p> <ul style="list-style-type: none"> • Teaching Science Using Inquiry • 5 E Learning Cycle <p><u>Reading</u></p> <ul style="list-style-type: none"> • Cianciola article (Bb Inquiry folder) • Orlich Chapter 9 (course pack pg 65-104) • MSU website: http://faculty.mwsu.edu/west/maryann.coe/coe/inquire/inquiry.htm • 5 E website: http://members.cox.net/jjedwards2/mypage1/5E%20Cycle%20for%20Planning%20Effective%20Lessons.htm 	<p style="text-align: right;">1/18</p> <p><u>Topics</u></p> <ul style="list-style-type: none"> • Questioning • Other Strategies that Support Inquiry Teaching • Small Group Learning <p><u>Reading</u></p> <ul style="list-style-type: none"> • Orlich Chapter 7 (course pack pg 105-142) • Johnson article (course pack pg 143-148) • Springer article (course pack pg 149-180) <p>Due</p> <ul style="list-style-type: none"> • Bias Reduction Plan
<p style="text-align: right;">1/23</p> <p><u>Topics</u></p> <ul style="list-style-type: none"> • Science and Technology <p><u>Reading</u></p> <ul style="list-style-type: none"> • Course notes (Technology) 	<p style="text-align: right;">1/25</p> <p><u>Topics</u></p> <ul style="list-style-type: none"> • Lectures and Demonstrations <p><u>Reading</u></p> <ul style="list-style-type: none"> • Chiapetta Chapter 6 (course pack pg 181-204) <p>Due</p> <ul style="list-style-type: none"> • Small Group Learning Plan
<p style="text-align: right;">1/30</p> <p><u>Topics</u></p>	<p style="text-align: right;">2/1</p> <p><u>Topics</u></p>

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<ul style="list-style-type: none"> Constructing Inquiry-based Lesson Plans Teacher A/Teacher B <u>Reading</u> <ul style="list-style-type: none"> Orlich Chapter 9 (course pack pg 65-104) 		<ul style="list-style-type: none"> In-class Demonstrations <u>Reading</u> <ul style="list-style-type: none"> All relevant Due <ul style="list-style-type: none"> Present Demonstrations 	
<p style="text-align: right;">2/6</p> <u>Topics</u> <ul style="list-style-type: none"> In-class Demonstrations <u>Reading</u> <ul style="list-style-type: none"> All relevant Due <ul style="list-style-type: none"> Technology Integration Plan Present Demonstrations 		<p style="text-align: right;">2/8</p> <u>Topics</u> <ul style="list-style-type: none"> Constructing Inquiry-based Lesson Plans <u>Reading</u> <ul style="list-style-type: none"> Orlich Chapter 9 (course pack pg 65-104) Due <ul style="list-style-type: none"> In-class Demonstration Reflection 	
<p style="text-align: right;">2/13</p> <u>Topics</u> <ul style="list-style-type: none"> Science Education Reform Diffusion of Innovation <u>Reading</u> <ul style="list-style-type: none"> Course notes Better High Schools report (Bb Reform folder) Tough Choices report (Bb Reform folder) Diffusion of Innovation websites: http://www.ciadvertising.org/studies/student/99_fall/theory/millman/Diffusion.htm 		<p style="text-align: right;">2/15</p> <u>Topics</u> <ul style="list-style-type: none"> Lesson Preparation Due <ul style="list-style-type: none"> Science Education Reform Plan 	
<p style="text-align: right;">2/20</p> <u>Topics</u> <ul style="list-style-type: none"> Plan for School Practicum Lesson Preparation <u>Reading</u> <ul style="list-style-type: none"> All relevant Due <ul style="list-style-type: none"> Inquiry Lesson Plan 		<p style="text-align: right;">2/22</p> <u>Topics</u> <ul style="list-style-type: none"> Teaching Philosophy School Practicum Ongoing Lesson Reflection and Revision <u>Reading</u> <ul style="list-style-type: none"> All relevant 	
<p style="text-align: right;">2/27</p> <u>Topics</u> <ul style="list-style-type: none"> Resumes, Professional Presentation, Portfolios <u>Reading</u> <ul style="list-style-type: none"> All relevant Due <ul style="list-style-type: none"> Volunteer Journal 		<p style="text-align: right;">3/1</p> <u>Topics</u> <ul style="list-style-type: none"> Construction of Portfolios <u>Reading</u> <ul style="list-style-type: none"> All relevant Due <ul style="list-style-type: none"> Teaching Philosophy 	
<p style="text-align: right;">3/6</p> <u>Topics</u> <ul style="list-style-type: none"> Course Reflection and Evaluations <u>Reading</u> <ul style="list-style-type: none"> All relevant 		<p style="text-align: right;">3/8</p> <u>Topics</u> <ul style="list-style-type: none"> Final Exam Review <u>Reading</u> <ul style="list-style-type: none"> All relevant 	
Final Exam: 3/16 10:00-12:00am SCI 116			

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