



Science, Mathematics and Technology Education
*A national model of the highest quality preparation of
future science teachers*

Woodring College of Education
*Preparing thoughtful, knowledgeable, and effective
educators for a diverse society*

SCED 491 – METHODS IN SECONDARY EDUCATION FOR SCIENCE TEACHERS (5 CREDITS)

PREREQUISITES:

Admission to the secondary teaching program; a major or concentration in natural sciences; SEC 431 or 532; SCED 481.

COURSE SYLLABUS

Spring Quarter, 2014, CRN 21484

Class Meeting Times: M/W/F 2-3:50, SL230

Instructor: Don Burgess, PhD

Office: Miller 402D (also find me in SMATE on MWF)

Office Hours: MW 9:00-11:00 or M-F by appointment

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Course description: Study of literature, curriculum and teaching strategies in life, earth and physical sciences for grades 4-12, plus peer teaching and school observations.

TEXT

Although there are no “textbooks” in the traditional sense for this course, there are four books that you should obtain:

- *Everyday Assessment in the Science Classroom* (NSTA Press 2003)
- *Teaching High School Science Through Inquiry* (National Academy Press 2005)
- *Making Sense of Secondary Science: Research into Children’s Ideas* (Driver *et al.*, 1994)
- *How People Learn: Bridging Research and Practice*, (National Academy Press, 1999).

You may already have the last three of these from SCED 481. There are other books and readings that you will be required to use in the course. They will be available online on the course web site or in the Learning Resource Center (LRC). Refer to the class schedule for reading assignment and discussion dates. Nearly all of the reading assignments will be tied to a discussion and each of you will lead one of the discussions (see Leading a Discussion below).

COURSE OBJECTIVES

Throughout this course, you will engage in experiences that facilitate learning and growth towards the following learning targets and will be asked to evidence that depicts your learning

and growth in these areas:

1. I can employ the principles of differentiated instruction to make instructional planning decisions that ensure effective learning for all individuals in your classes.
2. I can design instructional units using Learning Progressions and the Understanding by Design planning process.
3. I can use an inquiry approach in my Middle School and High School science class.
4. I am learning the role of assessment for learning in a science class.
5. I can plan to evaluate various types of student-based information to make short and long term instructional decisions.
6. I can integrate sustainability and environmental education into my Middle School and High School science class.

NEXT GENERATION SCIENCE STANDARDS

We will be working with the **Next Generation Science Standards** in this class. You can obtain these online from the [NGSS](#). Please compile these into a notebook or in convenient file location on your computer for your continued reference as an educational professional. Schools still use the [Washington State Science Standards](#) as well, particularly as we wait for a new End of Course Exam (EOC) to replace the current 10th grade Biology Exam.

CONNECTION TO THE STANDARDS FOR A WASHINGTON STATE RESIDENCY TEACHING CERTIFICATE:

The goal of this course is for you to develop essential skills that will lead to your teaching certification in Washington State. These standards will be used in evaluating your performance during student teaching, and during your life-long development as an educational professional. The experiences we will have together in this course will provide you with a wealth of opportunities to grow as a professional in ways that align with your own needs as learners as well as the criteria & practices outlined in [Standard V](#). As we work with experiences from the field and attempt to make sense of them, it will be important for you to find ways to incorporate data/evidence from your interactions with students if at all possible:

<p>WAC 181-78A-270 (Residency) Program Approval Standard 5 – Knowledge and Skills</p>
<p>(1) TEACHER RESIDENCY CERTIFICATION</p> <p>(a) Effective Teaching</p> <p>(i) Using multiple instructional strategies, including the principles of second language acquisition, to address student academic language ability levels and cultural and linguistic backgrounds;</p> <p>(ii) Applying principles of differentiated instruction, including theories of language acquisition, stages of language, and academic language development, in the integration of subject matter across the content areas of reading, mathematical, scientific, and aesthetic reasoning;</p> <p>(iii) Using standards-based assessment that is systematically analyzed using multiple formative, summative, and self-assessment strategies to monitor and improve instruction;</p> <p>(iv) Implementing classroom/school centered instruction, including sheltered instruction that is connected to communities within the classroom and the school, and includes knowledge and skills for working with other;</p> <p>(v) Planning and/or adapting standards-based curricula that are personalized to the diverse needs of each student;</p> <p>(vi) Aligning instruction to the learning standards and outcomes so all students know</p>

WAC 181-78A-270 (Residency)	
Program Approval Standard 5 – Knowledge and Skills	
<p>the learning targets and their progress toward meeting them;</p> <p>(vii) Planning and/or adapting curricula that are standards driven so students develop understanding and problem-solving expertise in the content area(s) using reading, written and oral communication, and technology;</p> <p>(viii) Preparing students to be responsible citizens for an environmentally sustainable, globally interconnected, and diverse society;</p> <p>(ix) Planning and/or adapting learner centered curricula that engage students in a variety of culturally responsive, developmentally, and age appropriate strategies;</p> <p>(x) Using technology that is effectively integrated to create technologically proficient learners; and</p> <p>(xi) Informing, involving, and collaborating with families/neighborhoods, and communities in each student's educational process, including using information about student cultural identity, achievement and performance.</p>	
<p>(a) <u>Professional Development</u> Developing reflective, collaborative, professional growth-centered practices through regularly evaluating the effects of his/her teaching through feedback and reflection. Teacher Evaluation. After August 31, 2013, an approved preparation program for teachers shall require candidates for a residency certificate to demonstrate knowledge of teacher evaluation research and Washington's evaluation requirements. At a minimum, teacher preparation programs must address the following knowledge and skills related to evaluations:</p> <p>(i) Examination of Washington's evaluation requirements, criteria, four-tiered performance rating system, and the preferred instructional frameworks used to describe the evaluation criteria;</p> <p>(ii) Self-assessment, goal setting, and reflective practices;</p> <p>(iii) Evidence gathering over time;</p> <p>(iv) Use of student growth data and multiple measures of performance;</p> <p>(v) Evaluation conferencing; and</p> <p>(vi) Use of an online tool to review observation notes and submit materials to be included in evaluation.</p>	
<p>(b) <u>Teaching as a Profession</u></p> <p>(i) Participating collaboratively and professionally in school activities and using appropriate and respectful verbal and written communication.</p> <p>(ii) Demonstrating knowledge of professional, legal, and ethical responsibilities and policies.</p>	
<p>(c) <u>Performance Assessment</u> An approved preparation program for teachers shall require that each candidate engage in an assessment process approved by the professional educator standards board. The assessment will verify that the candidate for a residency teacher certificate can meet the teacher standards in (a), (b) and (c) of this subsection and understands teacher impact on student learning.</p>	

ACADEMIC DISHONESTY POLICY

Western Washington University students are responsible for reading, understanding, and following the policy and procedures regarding academic dishonesty as set forth in the *WWU Academic Dishonesty Policy and Procedure* (see Appendix D of the University Bulletin).

REASONABLE ACCOMMODATION POLICY

It is the policy of Western Washington University to provide reasonable accommodation to the known physical, sensory, or mental limitations of qualified individuals except where such accommodation would impose undue hardship on the institution. To request accommodation, students must contact WWU disAbility Resources for Students at 360-650-3844 or www.drs.wwu.edu

ASSIGNMENTS

Participants in this class will demonstrate mastery of the standards and learning objectives by completing the following. There is no “zero” option. All must be completed at a beginning or above level in order to earn a passing grade and credit for this the class. **ALL** assignments will be SELF and PEER as well as INSTRUCTOR evaluated.

Educators need to have three kinds of knowledge to function effectively in the classroom:

- Content knowledge—an understanding of the subject area to be taught. You are getting this through your academic major.
- Pedagogical knowledge—an understanding of how people learn and how to teach. We will work on this in SCED 481 and 491, but you have been covering this in your classes in Woodring.
- Pedagogical content knowledge—the major point to this course. What are the specific issues that are unique to teaching science? How is teaching science different from teaching art? You have already begun thinking about this in SCED 481.

To demonstrate your preparation in all these areas you will need to demonstrate the ability to plan lessons, implement at least portions of a lesson, and be reflective about your own practice. You will have the opportunity to demonstrate these skills through a variety of assignments listed below.

1. Semester or Year Plan 10%

One of your first tasks will be to create a year-long scope and sequence based on your disciplinary standards (NGSS).

2. Learning Progression 10%

Your second task will be to create a Learning Progression based on one of your big ideas from your year-long plan.

3. Learning Segment - Three Lesson Plans 30%

A major outcome of this course will be the development and presentation of a set of cohesive lessons that include all of the fundamental components for effective science teaching. These will be discussed and modeled at length during the course. The idea is that you select one big idea and outline in detail 3-5 cohesive edTPA-based lessons that address that idea. At the end of the quarter, you will present your learning segment to the class and walk the class through a portion of one of your activities. These can be the same lessons that you are teaching and filming as part of your practicum.

4. Classroom Demonstration 15%

Every student in the class will be required to set up and perform a science demonstration to the rest of the class sometime during the quarter. You will need to give a brief introduction to your demo, which must be accompanied by handouts for each person and instructor in the class. The handouts must include a very detailed explanation of the demo, including materials needed, procedures, and *safety concerns*. Consider borrowing a Video camera from ATUS to film your demonstration for reflection.

5. Leading a Discussion 10%

You will be responsible for leading one discussion during the quarter. This leadership will be done in individually or in pairs. It is your responsibility to do the reading, to locate a protocol (Linked on home page) and formulate focus questions based on both your and your classmates' ideas. You need to come to class on your assigned day prepared!

6. Reading Responses 10%

Reading reflections will include short written papers, notecard reflections and discussion prompts. Each response will show how the candidate gained new insights from reading and reflecting on a variety of research-based source material. Be sure to self assess using the reading response rubric before you turn them in.

7. Reflective Paper 15%

At the end of the quarter, you will write a short (3-5 page) reflective essay discussing your progress in this course and towards becoming a science teacher.

8. Teaching Professionalism S/U

Attendance is essential. Our class is organized in a workshop setting with independent work and conferring, small response groups and whole group discussions. *Your attendance in class is critical* for your peers and instructor's learning, as well as your own. Teachers are required to notify supervisors when they know they will be absent. If you know that you will be absent, please notify me in advance. If a family, personal emergency or illness results in missing class, please contact a peer in the class prior to the next class to make sure that you are up to date. Please do your part to keep current on the course readings!

GRADING

Assignments graded S/U will be entered into the grade book with a score of 1 for S or 0 for U. Raw scores on assignments will be reported as percent of points possible. Course grades will be computed on the basis of percent of points earned on all assignments. All assignments that will contribute to the course grade are described clearly with specific prompts found at the course Blackboard site. Scoring criteria for each assignment are indicated below and described in detail in the assignment prompt.

GRADING CONVENTION

95% = A
90-94% = A-

87-89% = B+
84-86% = B
80-83% = B-

77-79% = C+
74-76% = C
70-73% = C-

61-69% = D
60-Below = F

GENERAL EXPECTATIONS

1. **Your contributions to this course are essential!** Please come prepared to discuss the readings and your field-based experiences and observations. We will work to keep one another informed about current issues related to instruction, assessment and certification by taking responsibility for following educational news. There is likely to be disagreement about many of the topics we discuss in this class – remember that we should strive to challenge each other's assumptions and to do it in a positive, supportive environment. Be willing to listen and keep an open mind as your peers share their experiences and perceptions.
2. **Practice your “professional best”.** To thrive as a teacher, you must establish disciplined work habits. Participation in class discussions, timeliness, and high-quality work should be demonstrated in all you do for this course. All assignments should be word-processed and well-proofed. Professional competence requires attention to detail, including your language use and mechanics. Your work is considered a reflection of you as a potential teacher, so give every assignment the “final draft” treatment. Remember that we will be preparing documents for your professional portfolio in this course – be sure that your materials help you to shine!

REFERENCE/SUPPLEMENTAL MATERIALS

- Stiggins, R (2008) *An Introduction to Student-Involved Assessment FOR Learning* (Fifth Edition or later). Upper Saddle River, NJ: Pearson – Merrill Prentice Hall.
- Strickland, C.A. & Tomlinson, C. A. (2005). *Differentiation in Practice: A Resource Guide for Differentiating Curriculum, Grades 9-12*. Alexandria, VA: Association for Supervision and Curriculum Development.

- Tomlinson, C. A. (2003). *Fulfilling the Promise of the Differentiated Classroom: Tools for Responsive Teaching*. Alexandria, VA: Association for Supervision and Curriculum Development.
- Wiggins, G. & McTighe, J. (2006). *Understanding by Design – Second Edition*. Alexandria, VA: Association for Supervision and Curriculum Development.
- Wiggins, G. & McTighe, J. (2006). *Understanding by Design: Professional Development Workbook*. Alexandria, VA: Association for Supervision and Curriculum Development.

SCED 491-Spring 2014 – Tentative Schedule

<u>When</u>	<u>Topics</u>	<u>Reading Assignment Due on Day Listed</u>	<u>Assignments Due Electronically</u>
WEEK 1	Nature of Science Long-term Planning		
Wed April 2	<i>Introductions and icebreakers; Logistics of class NOS Activity</i> Discussion Sign-up		
Fri April 4	<i>Year-long Plan Workshop</i> DEMO INTRO Safety Intro Demo sign-up	<u>How People Learn Chapter 2 Alberts, Inquiring into Inquiry pp. 3-13.</u> Review your last reading card from 481 <u>Taking Science to School, Ch 1&2 (on web);</u>	
WEEK 2			
M April 7	<i>Metacognition Review</i> Watch: Earth Science video from Learner.org (Session six: Restless Landscapes, Scene 1: What is sand? Kevin 28:40-31:00; shows boy in “metacognitive moment”) <i>Year-long Plan Workshop</i> DEMO 1		
W April 9	<i>Science Notebooks Workshop</i>	<u>Depth versus Breadth</u> (Schwartz, Sadler, Tai) <u>White and Frederiksen, Inquiring into Inquiry pp. 331-370 (on web).</u>	
F April 11	<u>Field Trip to Blaine HS Notebooks and Year-long Plans</u> <u>(Nicole R., Jen Wright)</u> Blaine Bell schedule: Lunch ends 11:50 4th: 11:55 - 12:50 5th: 12:55 - 1:50 6th: 1:55 - 2:50		<u>Semester/Year-long DRAFT plan due for Peer feedback</u>
WEEK 3	Geo-scientific Thinking		
M April 14	Guest Dr. Scott Lineman	Reading and assignments for week forthcoming	TBA
W April 16	Guest Dr. Scott Lineman		TBA
F April 18	Guest Dr. Scott Lineman		TBA
WEEK 4	Assessment: Formative and Summative		
M April 21	<i>Learning Progressions Workshop</i> DEMO 2		
W April 23	<i>LASW Protocols Workshop</i>	Everyday Assessment, Ch. 2 & 5 Teaching high school science through inquiry Ch. 7; Available in LRC	<u>Semester/Year-long plan due</u>

F April 25	FIRST ANNUAL IRWIN L. SLESNICK STEM EDUCATION SYMPOSIUM: April 25, 2014, Noon to 6 p.m.		Please plan on attending some or all
WEEK 5	Teaching about Evolution		
M April 28	<i>Teaching about Evolution Natural Selection Workshop</i> DEMO 3		
W April 30	<i>Teaching about Evolution: Legal rights and responsibilities Workshop</i>	Teaching about Evolution and the Nature of Science Ch. 1 & 5; Evolutions Struggle for Existence in America's Public Schools Antolin and Herbers The Effect of Engaging Prior Learning on Student Attitudes toward Creationism and Evolution , Verhy	
F May 2	<i>Teaching about Evolution</i> Field Trip to Squalicum HS (Amy Lawson)		<u>Learning Progression Draft due for Peer Feedback</u>
WEEK 6	Inquiry: Environment and Sustainability		
M May 5	<i>Open-ended Inquiry: Ecology Workshop</i> DEMO 4		
W May 7	<i>Open-ended Inquiry: Ecology Workshop</i>	Leave No Child Inside (Louv) , The Window into Green (Weilbacher)	
F May 9	<i>Field-based Inquiry</i> Field Trip to Whatcom MS Garden Project		<u>Learning Progression due</u>
WEEK 7	Guided Inquiry: Teaching with Kits: Properties of Matter		
M May 12	<i>Learning Segment and edTPA Lesson Planning Workshop</i> DEMO 5		
W May 14	<i>Properties of Matter Workshop</i>	White and Frederiksen, Inquiring into Inquiry pp. 331-370 (on web).	
F May 16	Field Trip to Fairhaven MS		
WEEK 8	Guided Inquiry using Technology: PET 1		
M May 19	<i>Teaching with Technology: PET Cycle 1 Workshop</i> DEMO 6	Teaching Science and Technology in the Context of Societal and Personal Issues	
W May 21	<i>Safety Workshop</i>		
F May 23	Field Trip to Horizon MS Technology		<u>Learning Segment Draft due for Peer Feedback</u>
WEEK 9	Guided Inquiry using Plate Boundary Jigsaw		
M May 26 Holiday	Guided Inquiry: Plate Boundary Jigsaw DEMO 7		

W May 28	OPEN TBA	Discussion: <i>Everyday Assessment, Ch 4;</i> <i>Teaching High School Science, Ch. 8</i> <i>Available in LRC</i>	
F May 30	Brian McNeven visit or Field Trip to Bellingham HS		<u>Learning Segment Due</u>
WEEK 10			
M June 2	DEMO 8		
W June 4	Inquiry Wrap Up		
F June 6	<u>Unit Lesson Gallery Walk</u> <u>Course Learning Reflections</u> <u>Final Evaluations</u>		
Final	No Meeting		Reflective Paper Due Thursday, June 12 3:30 - 5:30 PM