

Syllabus for SED 4100 / SED 5110 (CRN#12758/14716) : Teaching Secondary Science

Oakland University

2018 Winter Semester : Monday 5:30-8:50pm : 150 Pawley Hall

Instructor:

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On Campus Office Hours:

Monday 12:00 – 4:00
Wednesday 11:00 – 1:00
Or by appointment

I'm happy to meet with you!

Course Overview

This methods class accompanies your work in schools during the winter semester and it's the first of two methods courses in the OU Secondary Education Program. The ideas, skills, and practices introduced this semester will be a start to the kind of work you will continue to engage for the rest of your teaching career. That is, **good teachers never stop learning**. The point of this course is to build your capacity to know what you need to keep learning. As you may suspect, this view of teaching science is more truly a journey than a destination. This course will help you learn the practical knowledge you will need in order to keep you moving forward in this journey: this semester we will focus on the skills and practices of teaching science so that you will be able to teach all students well.

The class is structured around the notion of a “teaching cycle” and will use this framework to engage in the complexity of teaching science. The cycle itself however, is not complex. It considers the tasks of teaching to consist of the following three parts:

- **Plan.** Teachers must decide what they are going to teach. To do this, teachers must first focus on what they want their students to learn and what they want them to be able to do in the classroom. District, state and national content standards are a primary resource.
- **Teach.** Teachers must put their plans into action. This includes how to engage students in motivating and learning-centered activities. These activities must provide the intellectual scaffolding necessary for students to learn subject matter for understanding. Further, we will place special attention on those teaching practices that are most likely to improve student learning.
- **Analyze.** Teachers must determine what their students have learned and how to assign grades. But it also means learning to identify how students are making sense of their learning and how assessments can be used to improve the quality of an educational experience in addition to evaluating it. Formative assessment is foundational to improving teaching and learning. Additionally, teachers must inquire about and analyze their teaching. What went well? What might be changed to improve the educational experience for the students? How might goals, strategies and perspectives be changed? What can be learned from these teaching experiences? Have all of the students I teach made adequate progress?

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To accomplish this, we will begin focusing on the development of *High-Leverage Teaching Practices* (HLTPs). High-Leverage Teaching Practices are those that have been shown to provide the greatest impact on student learning in science. You are invited to explore the website from the University of Michigan that details the larger scope of research and development devoted to improving teacher education at www.TeachingWorks.org. This renowned effort is highly influential in the State of Michigan as well as nationally, and it informs our efforts at Oakland University to better prepare teachers in mathematics and science. Our work together this semester will target six HLTPs:

Targets for the development of High Leverage Teaching Practices (HLTPs)

- A. Explaining and modeling content, practices, and strategies
- B. Eliciting and interpreting individual students' thinking
- C. Interpreting the results of student work, including routine assignments, quizzes, tests, projects, and standardized assessments
- D. Designing single lessons and sequences of lessons

Course Assignments, Grading and Participation

Because this class is part of your professional preparation for teaching you are expected to meet a higher standard than is perhaps expected in other courses in the university. Specifically, you are expected to complete *all* assignments, to actively participate in *all* course discussions both during class sessions and in online formats, to challenge yourself to do your best and ultimately be the type of learner you want your students to be.

In addition this course is designed to address core competency professional education standards for teaching. These standards are called **InTASC Standards** and this course will begin attention to a number of them to include (numbering from InTasc standards documents):

Standard #3: The teacher works with others to create environments that support individual and collaborative learning, and that encourage positive social interaction, active engagement in learning, and self motivation.

Standard #4: The teacher understands the central concepts, tools of inquiry, and structures of the discipline(s) he or she teaches and creates learning experiences that make these aspects of the discipline accessible and meaningful for learners to assure mastery of the content.

Standard #5: The teacher understands how to connect concepts and use differing perspectives to engage learners in critical thinking, creativity, and collaborative problem solving related to authentic local and global issues.

Standard #6: The teacher understands and uses multiple methods of assessment to engage learners in their own growth, to monitor learner progress, and to guide the teacher's and learner's decision making.

Standard #7: The teacher plans instruction that supports every student in meeting rigorous learning goals by drawing upon knowledge of content areas, curriculum, cross-disciplinary skills, and pedagogy, as well as knowledge of learners and the community context.

Standard #8: The teacher understands and uses a variety of instructional strategies to encourage

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learners to develop deep understanding of content areas and their connections, and to build skills to apply knowledge in meaningful ways.

Standard #9: The teacher engages in ongoing professional learning and uses evidence to continually evaluate his/her practice, particularly the effects of his/her choices and actions on others (learners, families, other professionals, and the community), and adapts practice to meet the needs of each learner.

These standards will inform our work together and our progress toward being professionally prepared to teach. Because this is just one course in a professional sequence, we will not aim to demonstrate mastery of all these standards. Instead, we will make targeted progress on these standards and specific assignments will target this developmental process.

Attendance Policy

Attendance matters. It matters to me as your instructor and it matters to your peers who count on your support and feedback. Absence and lack of engagement hurts our learning community—if absent, you aren't able to share in other's insights and you aren't able to contribute your own. Throughout the program, teacher candidates must be present and on time for professional commitments, including classes and field experiences. Teacher candidates must communicate with their instructor, their university supervisors, and their mentor teacher(s) about any absences. Absences for which you have not pre-notified me or absences that we discuss together after the fact but cannot accept as valid become "unreasonable" absences. **All absences will have a negative impact on your grade (-3 percentage points)** and more than two unreasonable absences may result in a 0.0 grade for the course and multiple absences will likely lower your grade.

If you know you are going to miss a class, talk with me prior to that time. Help me understand why the absence is necessary. Also, make a plan to get the information from that class. If an emergency occurs, try to call me at the phone numbers above and leave a voice mail message.

Academic Integrity

Oakland's academic code of conduct is posted online: <http://www4.oakland.edu/?id=1610&sid=75> This code of conduct will be followed in this course and you are encouraged to read it.

I expect each of you to produce your own work that represents your own thinking. That does not mean that you cannot, or should not, speak to other people about assignments. Indeed, the opposite is true: **you can and should discuss your work with others** – your own thinking improves through interaction with others and their ideas. Also, there is much information available on the Internet that I expect you to make use of. This does mean, however, that you distinguish the ideas and words of others and your own. Use appropriate citation. Failure to uphold these standards may result in a 0.0 for both the assignment and the course.

“All members of the academic community at Oakland University are expected to practice and uphold standards of academic integrity and honesty. Academic integrity means representing oneself and one's work honestly. Misrepresentation is cheating since it means the student is claiming credit for ideas or work not actually his or her own and is thereby seeking a grade that is not actually earned. All academic misconduct allegations are forwarded to the Dean of Students Office and adhere to the student judicial system.”

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Course Readings and Materials

• **Required Texts:**

Student Membership in one of the following: MSTA (\$30), DMSTA or NSTA professional organizations. Suggested membership as well in discipline-specific organization too!

Wiggins, Grant, & McTighe, Jay (2005). Understanding by design, Expanded 2nd Edition. Alexandria, VA: Association for Supervision and Curriculum Development. Will also be used by your SED428 course.

This course requires a Via LiveText subscription. Via LiveText allows you to create and submit course assessments online and allows for long-term storage of projects, documents, and your teaching portfolio. Only one Via LiveText subscription is needed for the length of your program. Therefore, if you already have purchased Via LiveText for another course, you need not purchase an additional subscription for this course. If the purchase of Via LiveText is a hardship for you, please see your instructor. You can find more information at [LiveText FAQ](#) (note you must be signed in using your OU google account).

Texts Available online:

Flinn Science Laboratory Safety Course. <http://labsafety.flinnsci.com/Home.aspx>

America's Lab Report: Investigations in High School Science (2005). National Academies Press: Washington DC. Available online at: http://www.nap.edu/catalog.php?record_id=11311

Next Generation Science Standards (2013). <http://www.nextgenscience.org/>

How Students Learn: History, Mathematics and Science in the Classroom. (2005). National Academies Press: Washington DC. Available online at: <http://www.nap.edu/openbook.php?isbn=0309074339>

National Research Council Framework for K-12 Science Education (2012). National Academies Press: Washington DC. Available online at: http://www.nap.edu/catalog.php?record_id=13165

Taking Science To School: Learning and Teaching Science in Grades K-8 (2007). National Academies Press: Washington DC. Available online at: http://www.nap.edu/catalog.php?record_id=11625

Tools for Ambitious Science Teaching website: <http://tools4teachingscience.org/>

Assignments and Grades

Assignments are listed below. Complete descriptions and specifications will be provided at least a week in advance and discussed as we move through the term. The following total 100%:

- 5% Biography and Science goals essay
- 5% Equity in Science Education Essay
- 5% Professional Technology Resource Review & Presentation
- 10% Participation (both in-class and online)
- 10% Moodle Discussions
- 10% Lesson plans (2)
- 10% Flinn online [Safety Course Certification](#)
- 10% Content Tasks and Professional Reflections (throughout semester)
- 15% Unit Plan
- 20% Enactment / Analysis of High Leverage Teaching Practices HLTP (4)

The grading scale:

93.0 - 100.0	A
90.0 - 92.9	A-
87.0 - 89.9	B+
83.0 - 86.7	B
80.0 - 82.9	B-
77.0 - 79.9	C+
73.0 - 76.9	C
70.0 - 72.9	C-
69.9 and below	F

Learning Technologies

Please bring with you each week a laptop or internet capable device (iPad, iPod Touch, Droid device, etc.) if you are able. Because we will be engaging with technology substantively this semester, it will be helpful if you can do so. If you do not have access to such technology—we can certainly find such equipment for you via the SEHS Educational Resources Library or otherwise. Please let me know how I might help. We will routinely use web-based presentation tools and science learning simulations and applications throughout the semester. These will constitute some of the “content tasks” noted in the assignment list and will be fully described as we engage and develop them.

We will also be making use of video technologies this semester. If you do not have access to digital video recording devices—I can also assist you.

Texas Instrument Graphing Calculators, Vernier Labquest & probeware will be used this semester, such as the TI-84 and TI-nSpire graphing calculators. These tools allow for connections between science and mathematics and help students develop more powerful understandings of important ideas!

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Course Schedule

(Subject to revision)

Date:	Topic:	Reading to be done:	Assignment Due:
1/8	Introduction & Course Overview <i>Melting Ice</i> High Leverage Teaching Practices (HLTP): Eliciting and Interpreting Individual Students' Thinking		In class activities
1/15	No Class Meeting: <i>Martin Luther King Jr. Day Observed</i>		
1/22	HLTP: Explaining & Modeling Content. Part I	<i>How Students Learn: Introduction</i> p. 1-21 & <i>The Science of Learning</i> (Online)	Initial <i>Melting Ice</i> Hypothesis By end of Sunday, 1/15, <i>online</i> . Begin Flinn Safety Course <i>online</i> . Science Biography & Metaphor Essay by Monday, 1/23 noon.
1/29	HLTP: Explaining & Modeling Content. Part II	<i>Understanding by Design</i> , Introduction and ch. 1, 2, 4	Moodle forum: Revised <i>Melting Ice</i> Hypothesis by end of Sunday. Math: Spot Problem Solution Forum of UbD Intro and Ch. 1 Concept Map of UbD 1, 2, 4.
2/5	Next Generation Science Standards Common Core Math Standards	<i>How Students Learn: Science in the classroom, &/or Math in the classroom</i>	Register for MSTA conference Online Forum Stage 1a of UbD
2/12	HLTP: Explaining & Modeling Content. Part III	NGSS & NRC Science Framework <i>online</i>	HLTP Analysis 1 Online forum
2/19	Winter Break— <i>no class</i>		
2/26	History of Science as resource for teaching.	UbD, Ch. 2 Tools4Teaching reading	HLTP Analysis 2
3/5	HLTP: Tasks Texts and Learning Goals . Part I	6UbD. Ch. 3 Tools4Teaching reading	Safety Course Check Lesson Plan #2
3/12	HLTP: Tasks Texts and Learning Goals . Part II	Tools4Teaching reading	HLTP Analysis 3 Stage 1 & 2 of Unit Plan
3/19	Classroom Management. HLTP: Eliciting and Interpreting Student Thinking. Part I	Classroom Management In Science reading, moodled	moodle forum. Equity in Science Education essay
	HLTP: Eliciting and Interpreting Student Thinking. Part II Teacher Blogs and Online Resources	Tools4Teaching reading	Technology Resource Review and Presentations

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3/26	HLTP: Eliciting and Interpreting Student Thinking. Part III	TBD	Unit Plan check
4/2	Technology and Science Teaching	TBD	HLTP Analysis 4
4/9	Questioning and Leading Discussions	TBD	Mini Unit Plan Due
4/16	Synthesis of Science Teaching & Learning in Schools	TBD	Safety Course Completion
4/23	FINAL: Professional Presentation of Teaching Practices		Final Presentations

Additional notes and comments:

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