

## SCI 510: Using Vernier Technology to Teach the Next Generation Science Standards (NGSS) to Grades 6-12

Two, quarter hour graduate credits

Instructor: Susan Duncan

Email: duncans@pdx.edu

Please do not hesitate to email me with any questions you might have throughout this class. Starting July 20, 2015, I will be available online on Mondays between 8:30 and noon (Pacific Standard Time). I'd be happy to use the [Google Chatting](#) feature on our class' website to talk, or we can email back and forth.

### Course Description:

This course is designed to provide graduate credit for your implementation of the knowledge gained from attending a Vernier workshop. The coursework is flexible so you can find the best and most applicable method of applying your knowledge to the classroom. Through this course, you will also gain an understanding of the Next Generation Science Standards (NGSS).

Course Goals	Corresponding Assignments for Online Course
<ul style="list-style-type: none"> <li>➤ Gain a better understanding of the scientific and engineering practices outlined in the Next Generation Science Standards (NGSS). This will facilitate the understanding and use of effective strategies to engage students in scientific inquiry or engineering design (Pedagogical Content Knowledge).</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Introduction to the Next Generation Science Standards <ul style="list-style-type: none"> <li>○ Read, or view video</li> <li>○ Participate in on-line discussion</li> </ul> </li> <li><input type="checkbox"/> Reflecting on How Science Education Can Change <ul style="list-style-type: none"> <li>○ Participate in on-line discussion</li> </ul> </li> <li><input type="checkbox"/> Understanding the Complexity of a Practice <ul style="list-style-type: none"> <li>○ "Unwrap" the components of a science or engineering practice</li> </ul> </li> <li><input type="checkbox"/> Observing Practices in a Classroom <ul style="list-style-type: none"> <li>○ Watch video, assess, post and comment on a classmate's post</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>➤ Use effective strategies to engage students in scientific inquiry or engineering design (Pedagogical Content Knowledge)</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Developing a Lesson Plan: <ul style="list-style-type: none"> <li>○ Students use Vernier probeware, participate in a science and engineering practice, and either ask their own inquiry question or identify their own engineering problem.</li> </ul> </li> <li><input type="checkbox"/> Online Analysis and Critique of the Lesson</li> <li><input type="checkbox"/> Rubric Used to Assess Student Work: <ul style="list-style-type: none"> <li>○ Post your rubric on our class website and assess a classmate's rubric.</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>➤ Develop a science inquiry or engineering design experience for 6 -12 students that emphasizes deep content knowledge and higher-order cognitive skills by addressing learning goals in both areas. (Effective Instructional Practices)</li> </ul>	

The primary means by which you will conduct this work is through the lens of the science and engineering practices outlined by *A Framework for K-12 Science Education*. Three documents will support your learning in this course:

- [\*A Framework for K-12 Science Education\*](#)
- [\*Read Appendix F: Science and Engineering Practices from NGSS\*](#)
- *The Next Generation Science Standards*, [\*NGSS\*](#)

The estimated time commitment for this course is approximately 20 hours. To successfully complete this course, and earn the credit, you need to complete all of the following tasks (hours listed are approximations only, please see the class website for details for each assignment):

Sections of the Course	Corresponding Assignments	Estimated Time to Complete	Suggested Deadline
<b>Welcome and Overview</b>	Attend a Vernier Workshop	4 hours	
	Online Action Plan for the Class	10 minutes	July 24, 2015
<b>Connecting Your Curriculum to the Next Generation Science Standards (NGSS)</b>	Introduction to the Next Generation Science Standards	2 hours	July 31, 2015
	Reflecting on How Science Education Can Change	0.5 hours	July 31, 2015
	Understanding the Complexity of a Practice	1 hour	Aug. 7, 2015
	Observing Practices in a Classroom	1 hour	Aug. 14, 2015
<b>Using Vernier Equipment in Your Classroom</b>	Online Survey About Your School's Vernier Equipment	0.5 hour	Aug. 14, 2015
	Developing a Lesson Plan	6.5 hours	Aug. 28, 2015
	Online Analysis and Critique of the Lesson	1.5 hour	End of Term
<b>Assessing Student-Work</b>	Rubric Used to Assess Student Work	1.5 hour	End of Term
<b>Earning Credit for This Course</b>	Complete an Online Evaluation of the Course	10 minutes	End of Term

### **Brief Explanation of the Course Assignments**

(See the [course website](#) for a comprehensive description)

- 1.) Attend a Vernier Workshop
- 2.) Online Action Plan for the Class: Follow the link on the class website to plan how you will complete all of the assignments for this class

- 3.) Introduction to the Next Generation Science Standards: Gain a better understanding of the Next Generation Science Standards and the science and engineering practices by
  - a.) Reading or watching background information
  - b.) Participating in an online discussion
- 4.) Reflecting on How Science Education Can Change: Participate in an online discussion to analyze how science education can change based on the effective implementation of the NGSS.
- 5.) Understanding the Complexity of a Practice: “Unwrap” all of the components of one science and engineering practice
- 6.) Observing Practices in a Classroom: Watch a video online, assess the classroom environment, post your score from the assessment, and comment on a classmate’s post.
- 7.) Online Survey About Your School’s Vernier Equipment: follow the link on the class website to give us feedback on what type of equipment you have available.
- 8.) Developing a Lesson Plan: Develop a lesson plan for your students that asks them to use Vernier probeware, participate in a science and engineering practice, and either ask their own inquiry question or identify their own engineering problem.
- 9.) Online Analysis and Critique of the Lesson: Follow the link on the class website to reflect on your lesson plan
- 10.) Rubric Used to Assess Student Work: Post the rubric or checklist you used to assess your students’ work on our class website and assess a classmate’s rubric.
- 11.) Complete an Online Evaluation of the Course

Assessment in this course will take the form of the online surveys, online discussions, and electronic submissions of written work described above. For the sake of an online learning community, please follow the deadlines outlined above for the first 6 assignments. For the remaining assignments, you will have up to one calendar year from the time you register to complete the tasks required for the course.

Because of this flexibility, you will have the option of earning an 'incomplete' in the term for which you register if you need, and have not yet used, your calendar year. When you complete the Action Plan, you will choose your 'end date' for work in the course with the instructor. It can correspond with the term you register or be later in the year. The instructor is happy to answer any questions about the coursework or deadlines.

Here are the final dates to submit assignments for each term:	Summer - Sept. 2, 2015
	Fall - Dec. 7, 2015
	Winter – Mar. 14, 2016
	Spring – June 6, 2016

### **List of Assignments**

- 1.) Attend a Vernier Workshop
- 2.) Online Action Plan for the Class
- 3.) Introduction to the Next Generation Science Standards
- 4.) Reflecting on How Science Education Can Change
- 5.) Understanding the Complexity of a Practice

- 6.) Observing Practices in a Classroom
- 7.) Online Survey About Your School's Vernier Equipment
- 8.) Developing a Lesson Plan
- 9.) Online Analysis and Critique of the Lesson
- 10.) Rubric Used to Assess Student Work
- 11.) Complete an Online Evaluation of the Course