

Inspiring Students with Sustainable Invention

Course Syllabus

Updated Feb 22, 2022

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Class Meeting Information

This is a virtual course with work expected to be completed from July 6- July 20, 2022.

Virtual Meet-up Dates:	Office Hours:
July 6, 7, 12 & 13 9:30 am -11:00 am PDT <i>Zoom Call Information will be sent via email.</i>	July 8 1:30 - 3:00pm July 14th 1:30 - 3:00pm <i>Zoom Call Information will be sent via email.</i>

Instructor Information

Instructor	Email (business days + once/weekend)	Cell Phone (in case of emergency)
Kristin Moon	kmoon@pps.net	503-715-6427
Bethany Taft	bethany.taft@orecity.k12.or.us	503-547-4147
Kate Anderson	kate_anderson@beyondbenign.org	781-640-2516

Kristin Moon is the Program Administrator of Technology and Engineering at Portland Public Schools in Portland, Oregon. Kristin has worked as a middle school science, math, STEAM, english, and technology teacher for 15 years prior to becoming an STEAM instructional specialist for 5 years at the school and district level. Kristin earned her Doctorate of Education with a focus on Teacher Leadership from Concordia University Portland in 2020. As the Technology and Engineering Program Administrator, to work with schools, teachers, families, and community partners in her school district to integrate place-based invention and STEAM learning opportunities for students who are historically underrepresented in STEAM fields.. Kristin has worked with Oregon MESA (Math, Engineering, Science Achievement) as a school

chapter advisor, invention education curriculum writer, and provided professional development for chapter advisors and mentors. In the past year, Kristin has collaborated with invention educators to create the Invention Education Ambassadors who are committed to supporting during the school day educators learning how to integrate invention into classroom instruction. She has extensive experience leading teacher professional development for the past 10 years focused on integrating STEAM, invention, and project-based learning into K-12 instructional practice.

Bethany Taft earned her Masters in Teacher from Lewis & Clark College after graduating with her degree in Biology and Chemistry from George Fox University. She's been teaching high school science for twelve years, currently at Oregon City Service Learning Academy (OCSLA), an alternative charter high school in Oregon City. She has been leading JV InvenTeams (an invention-focused program through Lemelson-MIT) for 5 years, while also supporting other teachers as they run teams. She has helped design and lead professional development sessions around integrating invention into the classroom at various local, state, and national conferences. She also has led professional development sessions around using Restorative Circles, including in the science classroom. Additionally she runs the school's community garden and coordinates the school's Service Learning program, focused on community service and career exploration.

Kate Anderson earned her Master's in Education: Curriculum and Instruction with an emphasis in Environmental Education from Florida Atlantic University in 2006 after graduating with her B.A. degree in Political Science from the University of Massachusetts Boston. Kate's previous experience was as a program coordinator for non-profit environmental education programs, where she developed curriculum, taught K-5 programs, managed service-learning projects and supported professional development workshops and training for teachers. Kate's passion is working with students and teachers to improve education. As the Director of K-12 Education, she works to grow Beyond Benign's K-12 and Community Engagement Programs to reach broader audiences by sharing the power of green chemistry invention. She has extensive experience leading teacher professional development for the past 11 years.

Prerequisites: Middle School or High School STEAM field classroom teaching experience

Course Description:

This course will provide educators an introduction to Green Chemistry and Invention Education and provide the skills and knowledge to integrate sustainable invention in their classrooms. Participants will integrate key green chemistry and sustainable invention instructional practices into a unit after experiencing instructional strategies as a learner, analyzing the strategies to support all students, and create a plan to integrate the practices into their instruction. The participants will focus on engaging students through problem-based phenomena, supporting students to use empathy to make sense of the causes of the problem, iterating solutions through testing and feedback, and supporting student explanation development of the problem-based phenomena.

Course Objectives

After completing this course, the student will be able to:

- Add the lenses of sustainable invention and green chemistry to their instructional practice
- Incorporate sustainable invention, green chemistry, and culturally relevant pedagogies and practices into their curriculum on daily and unit levels.
- Design units and lessons structured to focus on
 - Phenomena/context (student buy-in)
 - Empathy
 - Iteration
 - Student Explanation
- Modify a unit to integrate sustainable invention that will be used 2022-2023 school year.

Required readings:

All required readings will be given to participants in the form of PDF or web-linked documents. No book purchases are required although throughout the course participants will be given recommendations for further reading if they wish to purchase these.

Types of Communication

The expectation will be of participants to attend the virtual meet-ups on July 6-7 and July 12-13 from 9:30 am -11:00 am PDT. Over the course of the two weeks participants will submit assignments via Canvas to complete the course ontime by July 20.

Use of resources

We expect you to make use of materials in an ethical manner. Always cite your sources of information, and if you find you want to leverage someone's ideas, templates, etc., we expect you to credit the appropriate parties. Sadly, it's pretty easy to spot when a participant hasn't done so. Thanks in advance for being responsible!

Expectations of Students:

- Attend virtual class fully prepared to discuss all assigned material and complete the work in the Canvas course—share responsibility for the quality of the experience.
- Contribute to the class discussion in a way that enhances the learning process.
- Conduct yourself in class as you would in a business situation (i.e., be courteous, offer constructive criticism, compliment on a job well done, and give thoughtful feedback).
- Provide ongoing feedback with regard to the extent in which this class is meeting your expectations and objectives.

**Please reach out as soon as possible if you have any emergencies or need more time to complete the course. We may or may not be able to accommodate this request.

Expectations of the Instructor:

- Review course content, materials and assignments prior to the start of the class
- Share syllabus prior to the start of the course
- Respond to individual email within 48 hours.
- Give you individual feedback on assignments.
- Enjoy teaching you and learning from you!

Evaluation and Grading

In this course you will be evaluated in the following way:

Virtual Class Participation (incl. daily reflections)	50%	July 6, 7, 12 & 13
Presentation of developed unit/lesson	10%	July 13th
Unit adapted for implementation 2022-2023	30%	July 20th
Reflection on class and unit design	10%	July 20th
	100%	

Grading Scale

- A = 90% – 100%
- B = 80% – 89%
- C = 70% – 79%
- D = 60% – 69%

Course Outline

Instruction Time Total: 15 hours

Introduction to Sustainable Invention + Green Chemistry	July 6
Instructional time	1.5 hours
Learning resources	John Warner video (what is GC and why) What is Sustainable Invention & why Activity - Packing Peanut Activity Sustainable Starter Link to activity
Objectives	Students will: <ul style="list-style-type: none"> ● Develop a definition of Green Chemistry and Sustainable Invention ● Identify a local plastic-based sustainability issue & connect it to a unit & standards
Assignments	Daily Reflection: 1 pager reflecting on your current integration of Green Chemistry & Sustainable invention, brainstorm ideas on opportunities to integrate, including units and standards.

Method of instruction	Video viewing Small & whole group discussion Individual Reflection
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Instructional Practices: Problem-Based Phenomena & Student Explanations	July 7
Instructional time	1.5 hours
Learning resources	Recycling Bin challenge Analyze through lens Traits of an Inventor
Objectives	Students will: <ul style="list-style-type: none"> ● Learn about 2 strategies to engage students in problem-based learning ● Learn about 2 strategies to engage students in student explanations
Assignments	Daily Reflection: One pager self-assessing your current practice engaging students in problem-based phenomena and student developed explanations. Choose 1-2 new strategies you would like to implement and discuss why.
Method of instruction	Engineering & Design Small & whole group discussion Individual Reflection

Instructional Practice: Empathy & Iteration	July 8
Instructional time	1.5 hours
Learning resources	Look at the Problem of Recycling material challenges using the Tea Party Strategy
Objectives	Students will: <ul style="list-style-type: none"> ● Learn about 2 strategies to engage students in empathy ● Learn about 2 strategies to engage students in iteration

Assignments	Daily Reflection: One pager self-assessing your current practice engaging students in empath and iteration. Choose 1-2 new strategies you would like to implement and discuss why.
Method of instruction	Engineering & Design Forum discussion Individual Reflection

Draft uniting	July 9-11
Instructional time	3 hours
Learning resources	Unit planning documents Lesson Plan template
Objectives	Students will: <ul style="list-style-type: none"> ● Try to make the design of the invention developed for their partner ● Draft 1-2 lessons that integrate strategies for one of the instructional practices (phenomena- based instruction, empathy, iteration, student explanation) addressing a topic in Green Chemistry and sustainable invention. <ul style="list-style-type: none"> ○ To be presented on August 2 to receive feedback.
Assignments	Develop an Integrated Sustainable Invention Unit
Method of instruction	Engineering & Design Reflection

Feedback & Revision	July 12 & 13
Instructional time	4.5 hours
Learning resources	Lunch & Learn Green Chemistry Panel 12- 1 (Virtual)
Objectives	Students will: <ul style="list-style-type: none"> ● Present draft of lessons for the unit ● Provide feedback to peers on their lessons
Assignments	Draft 1-2 more lessons from their unit that integrate strategies for one of the instructional practices (phenomena- based instruction, empathy, iteration, student explanation) addressing a topic in Green Chemistry and sustainable invention.

Method of instruction	Small group discussion Reflection
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Revising unit work	July 14-20
Instructional time	3 hours
Learning resources	Unit Rubric
Objectives	Students will: <ul style="list-style-type: none"> ● Incorporate feedback from peers into final draft of unit
Assignments	Revise lessons and unit based on feedback received and in line with rubric provided. Reflection on learnings from class and development of unit
Method of instruction	Individual Work