

**Promoting science inquiry in middle school classrooms:
Water quality in freshwater habitats**

ESM 450-001/UNST 421-555 CRN: 41330/44272

Course Location: SRTC B1-82
Course Dates: Winter 2016
Course Time(s): TR 12:00-1:50pm (times will vary for field trips)

Required additions: frequent trips to Sherwood Middle School (5) and Tualatin National Wildlife Refuge (5)

****trips will depart PSU promptly at noon and arrive back around
2:30pm****

Instructor: Professor Angela Strecker **Office hours:** W, R 9-10am
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Science Building I, rm 321 (mailbox SRTC, rm 218)

COURSE DESCRIPTION

Globally, freshwater ecosystems are at risk from a number of anthropogenic stressors. One of the foremost stressors is declines in water quality. We will partner with Sherwood Middle School to promote scientific inquiry into water quality issues in the Tualatin National Wildlife Refuge (NWR). The Tualatin NWR is one of a handful of urban wildlife refuges in the nation, highlighting a unique region where urban areas intersect with natural spaces. Understanding the effects of environmental stressors on aquatic ecosystems in this unique area is of importance to citizens and managers. University students will mentor 6-8th grade schoolchildren in the development of scientific experiments, hypotheses, study implementation, analysis, interpretation, and presentation of study results. Middle school students will develop a research question that pertains to water quality within the refuge. University students will also have the opportunity to learn more broadly about water quality issues in freshwater ecosystems. **A background check will be required.**

MISSION AND BROAD LEARNING OBJECTIVES

- To learn how patterns of globalization and environmental change have altered native biological communities and water quality, and what our responsibilities are as citizens.
- To enable middle school students to develop effective hypotheses and inquiry-driven science, including evaluation and presentation of results.
- To broaden participation in scientific inquiry and increase scientific literacy in society.

SPECIFIC LEARNING OBJECTIVES

Communication

- Learn to relate scientific information into terms that middle school children can understand.
- Learn to work effectively in a group.

Working in a Diverse Society

- Explore differing value sets and their implications for environmental stewardship and science learning.

Critical Thinking

- Learn to develop research questions, implement experiments, analyze, interpret, and present results of scientific studies.
- Learn to develop concise and accurate reporting and writing skills.

Social Responsibility

- Explore and foster concepts of environmental stewardship and citizen science.

COURSE OUTLINE

I will be using Desire2Learn (D2L), an online resource, to occasionally post materials and for some assignment submissions. Make sure to check it and your @pdx.edu account.

Recommended Textbook: *Teaching Inquiry Science in Middle and Secondary Schools* by Anton Lawson.

Student Code of Conduct: <http://www.pdx.edu/dos/codeofconduct>

Also, because you will be working with younger school children, you must adhere to a unique code of conduct for this class: your language and actions must be appropriate for a middle school classroom, and you must agree that all forms of communication with your student group will be mediated by myself (e.g., Facebook is not acceptable). If you disregard this code of conduct, you will be asked to stop attending field trips.

Statement on Academic Honesty: Plagiarism or academic dishonesty of any form will not be permitted in this class and will result in a failing grade for the assignment. For more information, please see Portland State University's policy on academic honesty.

Sickness policy: Attendance is critical to your success in this class. I expect you to attend and participate in class. If you are absent please find out what you missed by asking your fellow students and/or speaking with me.

Late assignments: To be fair to all students, late assignments will be penalized 5% per day. If you have an emergency situation, please let me know.

Grading scale:

A: "superior", high level integration and conceptual development with factual accuracy

B: "above average", accurate with significant integration and conceptual development

C: "basic quality", mostly accurate and simply factual, modest concept development

A 94 – 100

B+ 87 – 89

C+ 77 – 79

D+ 67 – 69

A- 90 – 93

B 83 – 86

C 73 – 76

D 63 – 66

B- 80 – 82

C- 70 – 72

D- 60 – 62

Email Etiquette: As much as possible, please come to office hours to ask questions. If these times do not work for you, send me a message to set up an alternative time. Email should be a last resort. If you do need to send me an email, please follow these general guidelines:

- include an informative subject line (e.g., assignment #1 for ESM 450)

- include a salutation (e.g., Dear, Hello)
- address using proper titles (e.g., Dr. Strecker)
- include your name, student #, and what class you are in

As this is a professional environment, do not expect to receive a reply to your message after 5pm or on weekends; normal turnaround time for email is ~48 hours.

GRADE BREAKDOWN

Unless otherwise specified, assignments are due at the beginning of class period.

- **Class Participation – 20%**
On-time attendance, preparation, and engagement in the day’s topics and discussions are required for all field trips, classes, and activities.
- **Reflection Journal – 20%**
Students will write reflections in response to a question that will be provided following field trips. Students will be graded on completeness and thoughtfulness.
- **Discussions – 20%**
Periodic discussions will be centered on articles regarding promoting scientific engagement and inquiry in classrooms, which will be accompanied by an article summary. Students will be evaluated on participation and article summaries.
- **Blog – 5%**
Students must contribute to shared blog with middle school students.
- **Video – 15%**
Groups will create a short video that describes the goals of the class, the approaches used to encourage scientific inquiry, and some of the outcomes.
- **Press Release – 5%**
Students will write a press release that describes the partnership between PSU and Sherwood Middle School.
- **Final Paper – 15%**
This essay will present your understanding of the interactions of the environmental change, scientific inquiry and literacy, and your experiences in implementing your project.

SCHEDULE (* = date is tentative)

Week	Date	Topic	Assignment
1	T Jan 5	Introduction to the scientific method and science inquiry	
	R Jan 7	Introduction to freshwater ecology Required Reading: <i>Issues in Ecology “Sustaining Healthy Freshwater Ecosystems”</i> (D2L folder, “Reading Materials”) Recommended Reading: <i>Chapters 1 & 2</i>	
2	T Jan 12	Field trip to Tualatin National Wildlife Refuge – introduction to the refuge (inside) Recommended Reading: <i>Chapter 3 & 4</i>	
	R Jan 14	Field trip to Sherwood Middle School – ice breaker, introductions, preparation for field trip Recommended Reading: <i>Chapter 9</i>	

3	T Jan 19	Field trip to Tualatin National Wildlife Refuge (just PSU) – naturalist orientation Required Reading: <i>Human Environment, Physical Environment, Biological Environment (D2L folder, "Reading Materials")</i>	Journal entry #1
	R Jan 21	Field trip to Tualatin National Wildlife Refuge – exploration, learning about water issues	
4	T Jan 26	Prepare to lead groups on the field trip	
	R Jan 28	Discussion of article (Roth and Lee 2004)	Article #1 summary
5	T Feb 2	Field trip to Sherwood Middle School – preparation for field trip, practice water quality testing Recommended Reading: <i>Chapter 6</i>	Journal entry #2
	R Feb 4	Field trip to Tualatin National Wildlife Refuge – field study of water quality	
6	T Feb 9	In class discussion of outcomes of field trip, planning for data analysis and presentations Recommended Reading: <i>Chapter 8</i>	
	R Feb 11	<i>no class</i>	
7	T Feb 16	Planning and work session for video	
	R Feb 18	Discussion of article (Chou et al. 2012)	Article #2 summary
8	T Feb 23	Field trip to Sherwood Middle School – work with students to organize, display, and analyze their data Recommended Reading: <i>Chapter 12</i>	Journal entry #3
	R Feb 25	Field trip to Sherwood Middle School – work with students to organize, display, and analyze their data	
9	T Mar 1	Work session for video	*Press release
	R Mar 3	Discussion of article (Krasny et al. 2015) Work session for video	Article #3 summary
10	T Mar 8	Field trip to Sherwood Middle School – work with students to organize, display, and analyze their data	
	R Mar 10	Field trip to Tualatin National Wildlife Refuge – research presentations and wrap up	*Video
Finals week	R Mar 17	Wrap-up **10:15am-12:05pm	Final paper due March 18 at 10pm