

Using a College Curriculum and Informal Science - Heberts Supplemental Material - CSO Syllabus

COMMUNICATING SCIENCE THROUGH OUTREACH

BIOS 430/830

Spring 2019

COURSE LOGISTICS

MWF 9:30 – 10:20

Manter 124

INSTRUCTOR

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Office Hours: By Appointment**COURSE DESCRIPTION**

Communicating Science through Outreach is a lecture/service course that pairs classroom training in informal science education with on-the-ground experience through leading a weekly, after-school science club at a local Community Learning Center middle school. Throughout the course we will meet with experts in designing inquiry-based learning activities, K-12 curricula, and effective assessment of learning goals. For anyone interested in science education and effective science communication - especially education outside of the traditional classroom environment - this course provides an excellent opportunity to broaden your perspective and repertoire. You do not need to have any experience in working with middle school students to be successful in this class!

During the first 4 weeks, class meets 9:30 – 10:20 AM on Mondays, Wednesdays, and Fridays. For the remainder of the semester, class meets on Mondays and Wednesdays only (not on Fridays), and the 3rd class session is instead spent leading your after-school science club.

COURSE OBJECTIVES

1. Introduce students to best practices in informal science education.
2. Introduce students to the research and practice of science communication.
3. Aid students in the development and implementation of an informal science learning program focused on ecology and evolution.
4. Introduce students to assessment and evaluation strategies for measuring the impacts of their informal educational efforts.
5. Increase student's enthusiasm for and interest in developing and/or participating in informal science learning programs.

LEARNING OBJECTIVES – Students will be able to...

1. Explain similarities and differences between informal and formal science education.
2. Demonstrate an understanding of distinct science communication goals.
3. Describe and discuss the science of science communication.
4. Identify areas worthy of further study with respect to the research and practice of science communication.
5. Discuss middle school science standards at both the state and national level.
6. Create purposely-designed hands-on activities aligned with science communication goals and age-appropriate science standards.
7. Recognize, value, and build upon the diversity encompassed in target audiences.
8. Translate primary scientific literature into hands-on, engaging, fun activities for youth.
9. Rigorously assess the strengths/weaknesses and successes/failures of informal science learning programs.
10. Reflect upon, synthesize, and learn from informal science education experiences.

REQUIRED TEXTBOOKS – NONE**SUGGESTED TEXTBOOKS**

- *Communicating SCIENCE Effectively A Research Agenda*. 2017. The National Academies of Sciences, Engineering, Medicine Report.
- *How People Learn: Brain, Mind Experience and School*. 2000. Bransford, J.D., A. L. Brown, and R. C. Cocking.
- *Practical Evaluation Guide: Tools for Museums and other Informal Educational Settings*. Third Edition. 2016. Diamond, J., M. Horn, and D. H. Uttal.
- *Teaching about Evolution and the Nature of Science*. 1998.

TENTATIVE ASSIGNMENTS AND GRADING

Attendance (30 points total; 1 point/day for 32 days...2 misses “free”) - The success/failure of this course is 100% dependent upon the commitment and investment of the students. This is an upper level undergraduate/graduate level course and all students are expected to be present throughout the entire semester. Each class period is worth 2 participation points (total of 32 class periods). *You are allowed 2 free absences.*

Class Participation (55 points total) – Not only are you expected to be present, but you are expected to contribute to discussions and to actively engage in hands on activities.

You are also expected to reflect upon experiences and provide critical feedback to fellow classmates in a kind, respectful, and constructive manner.

Homework Assignments (35 points total)

Local Scientist Study and Activity (20 points): Choose *one* scientist based out of Nebraska and look through their publication list. Pick and thoroughly read *one* paper. Develop a hands-on activity that could convey the results of the paper. You will submit a 1-page written report with: (a) an overview of the main goals, methods, and findings of the paper (*10 pts*) as well as (b) your ideas about an activity about the paper (*10 pts*). In class, you will give a 4-minute “lightning talk” style presentation summarizing the paper (2 minutes) and describing your activity (2 minutes).

Local Outreach Event Report (15 points): Attend at least one science outreach event in Lincoln and complete the Local Outreach Event Report Worksheet (posted on Canvas). A calendar of events is included at the end of this syllabus. This worksheet must be submitted by February 27th.

Evaluation development (20 points total; 15 points for 1st draft; 5 points for final) - A large part of informal science education is learning how to assess the success/failure of your efforts. We will be spending time during the class to discuss the formal evaluation of informal science efforts. **Each team of students will be responsible for working to create an effective pre and post club survey.** *The results of these evaluations are expected to be incorporated into your final presentation.*

Weekly Program Plans & Weekly Program Reflections (330 points total: 15 points each (x2) x 11 weeks) - Students will be responsible for handing in (i) a **weekly program plan** and (ii) a **weekly program reflection**.

Only one weekly program is required each week from the group as a whole – group members must rotate each week who will lead the development and writing of the program. Grades for the weekly program will be shared by all members of the group.

Students must write their weekly reflection *individually*. A sample of a weekly program plan and a weekly program reflection are provided online. The program plans should contain sufficient detail for an individual unfamiliar with the project to be able to replicate the activities. Reflections should adequately convey what worked, what did not work, and how the program might be improved.

Weekly program plans are due **the day prior to your scheduled club by 9:30 AM.**

Weekly reflections are due by **within 24 hours of the end of your club.**

Group Participation (50 points total) - Similar to the class as a whole, the success of your clubs will depend on team effort – true team effort. I expect every participant to carry their full share of responsibilities. *We will work together as a class to come up with a rubric for group participation.*

Formal write-ups (100 points total) - Throughout the semester, each team of students will be responsible for developing ~12 different after-school programs. Many of these programs will be tested within our classroom first and then brought to the middle school science clubs. **Each individual team member is responsible for producing a formal write-up of one of their group’s programs. Group members may NOT write-up the same program.** We will work together as a class to come up with expectations and an associated rubric for formal write-ups.

Final Presentation (130 points total) - During the final week of the semester, each team will be asked to give a 30 minute presentation on their experience throughout the semester. The intended audience for this presentation is: parents of children who attended the club; administrators who need to be convinced that running after-school science clubs through UNL is a worthy endeavor; evaluators who have helped in the development of the evaluation process; Site Leaders who would like to see the outcome of their collaboration; and other faculty and students interested in potentially participating in such a course in the future. *We will work together as a class to come up with expectations and an associated rubric for final presentations.*

Graduate Student Literature Review (50 points)

Graduate students will be expected to put together a brief literature review on a topic of their choice and present the topic to the class. Topics should generally fall within the realm of *Science Communication* but could be as specific or general as the student’s interest. Topics need to be discussed and given the OK by the instructor at least a month prior to the due date. Students will submit a bibliography of at least 10 papers and give a 10-15 minute presentation to the class on their given topic.

TOTAL POINTS: 750 points (800 points for graduate students)

Attendance	30 points
Class Participation	55 points
Homework	35 points
Evaluation Development	20 points
Weekly Lesson Plans/Reflections	330 points (30 points * 11)
Group Participation	50 points
Formal Write-ups	100 points
Final Presentation	130 points

LETTER GRADES

The grades for this course will be entirely dependent upon how well you are able to master the material, not on how well you do relative to the rest of the class. The grading scale is as follows:

>97%	A+
93.0-96.9%	A
90.0-92.9%	A-
87.0-89.9%	B+
83.0-86.9%	B
80.0-82.9%	B-
77.0-79.9%	C+
73.0-76.9%	C
70.0-72.9%	C-
67.0-69.9%	D+
63.0-66.9%	D
60.0-62.9%	D-
<60.0%	F

PINTEREST

The emphasis of this class is on developing original activities for your clubs. Simultaneously, however, one of our priorities is to make sure we provide the best experience possible to our LPS students. Therefore, we do not want to rule out using activities from Pinterest, but we do not want to rely on them either. We prefer original activities, but it is OK to occasionally use an activity modified from Pinterest. Note Pinterest activities may be good starting points, they will benefit from your modification to your specific club setting and goals. If you do include activities from Pinterest in your clubs, *you must still include at least one original activity in your weekly club.*

If you choose to use an activity from Pinterest in one of your weekly clubs, it is *required* that you log in to our class Pinterest account, pin the chosen activity to the board for your club group, and credit the original Pinterest post in your weekly lesson plan and weekly reflection by providing a link to the post. The login information for the class Pinterest account is:

Username: CSOUNLcourse

Password: CS!clubs!

In addition, after running an activity originating from Pinterest, *you must post a comment to the original Pinterest activity* describing: the communication environment, the number of student participants, how you modified the activity, which communication goal(s) you used the activity to address, and how the activity went. *You must then include a copy of your comment in your weekly reflection.*

OTHER IMPORTANT INFORMATION

The Office of Services for Students with Disabilities (SSD) offers a wide variety of legally mandated services to students with documented disabilities. After reviewing your documentation, the SSD Director or Assistant Director will determine appropriate academic services and accommodations, depending on your functional limitations in the academic setting. The SSD staff will train you in accessing the accommodations for which you are eligible. You will then be responsible for requesting most accommodations in a timely manner and for following SSD policies and procedures for receiving services each semester. For more information, see the following website: <http://www.unl.edu/ssd/content/current-students>.

TENTATIVE COURSE SCHEDULE

WEEK	TOPIC	MATERIALS & ASSIGNMENTS
7 th January	Introduction & Orientation	NA
9 th January	Informal vs. Formal Science Education/Learning; Goals of Science Communication	READ: <i>Hebets (2018) A Scientist's Guide to Impactful SciComm</i> WATCH: One episode of "Bill Nye, The Science Guy" (original series) DUE: Bill Nye Worksheet
11 th January	Presentations from CSO Alumni	NA
14 th January	Using Primary Literature to make Informal Science Education Programming	READ: Cortesi and Cheney (2010)
16 th January	<i>Learning Styles</i> Kathie Phillips, CLC	**DUE: 4MAT Packet and Middle/Elementary School Handout READ: Chapter 3 in the following: https://www.nap.edu/read/9853/chapter/3
18 th January	Topic Discussions & Group Formation	**DUE: True Colors IN CLASS: Group contracts
21 st January	NO CLASS (Martin Luther King Day)	
23 rd January	<i>Evaluation & Assessment</i> Trish Wonch Hill, SBSRC	READ: Chapter 2 in the following: http://www.informalscience.org/evaluation/pi-guide <i>Next Gen. and NE Science Standards</i>
25 th January	Local Scientist Study Homework Presentations	**DUE: Local Scientist Study Activity
28 th January ** Visits to clubs this week**	Site Leaders Visit	
30 th January	<i>Collecting Observational Data</i> Ann Matthews, CLC	**DUE: Pre & Post Survey First Drafts
1 st February	NO CLASS	
4 th February	Dawes Club Practice	**DUE: Pre & Post Survey Final Drafts
6 th February	Mickle Club Practice	NA
8 th February	NO CLASS	
11 th February (Week 1) **Clubs Begin**	Park Club Practice	NA

13 th February	Dawes Club Practice	NA
15 th February	NO CLASS	
18 th February (Week 2)	Park Club Practice	
20 th February	SNOW DAY	
22 nd February	NO CLASS	
25 th February (Week 3)	<i>Working with Students in Afterschool Settings</i> CLC Site Leader Panel	NA
27 th February	Mickle Club Practice	
1 st March	NO CLASS	
4 th March (Week 4)	<i>ISE Training at Morrill Hall</i> Kathy French, UNSM	
6 th March	Mickle Club Practice	NA
8 th March	NO CLASS	
11 th March ** No Clubs**	<i>Making Rubrics for Formal Write-ups and Final Presentations</i>	
13 th March ** No Clubs**	Club Practice	**DUE: Local Outreach Activity Worksheet
15 th March ** No Clubs**	NO CLASS	
18 th March (Week 5)	UNL SPRING BREAK	
20 th March	UNL SPRING BREAK	NA
22 nd March	UNL SPRING BREAK	
25 th March (Week 6)	Mickle & Dawes Club Practice	NA
27 th March	Park Club Practice	NA
29 th March	NO CLASS	
1 st April (Week 7)	Mickle & Park Club Practice	NA
3 rd April	Dawes Club Practice	

5 th April	NO CLASS	
8 th April (Week 8)	Park Club Practice	**DUE: Formal write-ups
10 th April	Mickle Club Practice	
12 th April	NO CLASS	
15 th April (Week 9)	<i>SciComm at PopSci</i> Jason Lederman, Popular Science	READ: One Popular Science article of your choice; “7 Tips from Popular Science” Article
17 th April	<i>Graduate Student Lit Review Presentations</i>	**DUE: Grad student literature reviews
19 th April	NO CLASS	
22 nd April (Week 10)	Group Presentations	**DUE: Formal write-up revisions
24 th April	Group Presentations	
26 th April	Group Presentations	
29 th April (Week 11) **Last Week of Clubs**	Finals Week NO CLASS	
1 st May	Finals Week NO CLASS	
3 rd May	Finals Week NO CLASS	
5 th May SUNDAY (11:30 – 2:30)	SUNDAY WITH A JR. SCIENTIST (Morrill Hall)	

LOCAL SCIENCE OUTREACH EVENT CALENDAR (SPRING 2019)

Date	EVENT & LOCATION	TOPIC
Rescheduled (TBD)	Investigate Morrill Hall, 10 AM - Noon	Arachnid Defenses
20th January	Sunday with a Scientist Morrill Hall, 12:30 – 4:30 PM	Soil Investigations (Dr. Rebecca Young and the UNL Soil Judging Team)
Rescheduled (TBD)	Science Café The Happy Raven, 6:30 – 8:00 PM	
2nd February	Dinosaurs and Disasters Family Day Morrill Hall, 9:30 AM – 4:30 PM	
9th February	Investigate Morrill Hall, 10 AM - Noon	Lights and Lasers
17th February	Sunday with a Scientist Morrill Hall, 12:30 – 4:30 PM Celebrating 4 th Floor Opening!	The Collections (Nebraska State Museum Research Division)
26th February	Science Café The Happy Raven, 6:30 – 8:00 PM	
9th March	Investigate Morrill Hall, 10 AM - Noon	Species Invaders
26th March	Science Café The Happy Raven, 6:30 – 8:00 PM	How (Not) to be Eaten
31st March	Sunday with a Scientist Morrill Hall, 12:30 – 4:30 PM	Motion in the Ocean: Seafloor Geology (Dr. Lynne Elkins)
23rd April	Science Café The Happy Raven, 6:30 – 8:00 PM	
28th April	Sunday with a Scientist Morrill Hall, 12:30 – 4:30 PM	Earth's Darkest Hour: The Paleozoic and the Great Extinction (Drs. Tracy Frank and Chris Fielding)
5th May	Sunday with LPS Jr. Scientists Morrill Hall, 11:30 AM – 2:30 PM	Communicating Science through Outreach Course Middle School Clubs
11th May	Investigate Morrill Hall, 10 AM - Noon	Birds
28th May	Science Café The Happy Raven, 6:30 – 8:00 PM	