



AGRICULTURE & LIFE SCIENCES

Outreach: From Theory to Practice

ESSM 689, Fall 2019

Thursdays, 9 AM – 11:50 AM

Location: WFES 317

Instructor

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Course Description

Successful conservation outcomes, environmental health, and human capital development are just a few of the benefits of effective communication between scientists and the general public. Many major funding agencies evaluate research proposals' broader impacts as an integral part of proposal review. This ABS III graduate course, **Outreach: From Theory to Practice (ESSM 689)**, is designed to teach graduate students about informal STEM education (ISE), and how to incorporate ISE methods into outreach efforts to the general population. Students will learn about the role ISE plays in a democratic society and how ISE can impact a wide range of public policies from air quality monitoring to controlling the spread of zebra mussels. Using their gained insight into ISE, students will propose and implement an ISE program that relates to their own research or related STEM topic at an outreach event of their choosing.

Learning Outcomes

By the end of this course, students will be able to:

1. Articulate and critique the role of informal STEM education (ISE) in a democratic society
2. Evaluate the various ways that ISE can affect public policy
3. Assess the quality of ISE efforts and provide constructive feedback on how to improve or expand such efforts
4. Create an ISE activity that demonstrates an understanding of ISE
5. Present scientific research to the general public at an Outreach event

Absence and Late Work Policy

"The University views class attendance as the responsibility of an individual student. Attendance is essential to complete the course successfully. University rules related to excused and unexcused absences are located on-line at <http://student-rules.tamu.edu/rule07>."

Late assignments will be accepted only in the case of a University Excused Absence with no penalty within a reasonable timeframe (i.e., one week). All other work will be given a five-percentage point penalty for every day it is late, including weekends. University Excused Absences must have written verification, like a doctor's note.

Grading

All assignments must be submitted to pass this course.

The Standard Letter Grading Scale will be applied:

A = 90-100; B = 80-89; C = 70-79; D = 60-69; F = <60

Participation (30%)

Classes will be journal club format so plan to lead some discussions.

The syllabus is broken up into three sections as follows:

Part I: Informal STEM Education (ISE)

- ISE literature synthesis paper (15%)
 - Students must demonstrate their understanding of ISE theories and creatively explore what a successful Outreach event might look like based on the ISE literature (1,000 -1,500 words).

Part II: Public and Policy Impacts

- ISE Project Proposal (25%)

Students must design a project that can be implemented by the end of the course and has the potential to affect public attitudes or knowledge (this will be implemented in part 3 of the class). The project must have an evaluation component and implementation venues identified and secured for Part III of the course.

Part III: Educating the Public

- ISE Project implementation (20%)
- ISE Project Evaluation (10%)

Topics and Related Reading Assignments

NOTE: Required readings are subject to change

Part I: Informal STEM Education (5 weeks)*Week 1: Teaching and Learning in different contexts*

- What is “pedagogy” and what are the underpinnings of a quality educational experience?
- What is science education v communication
- Informal v Formal Science Education (similarities and differences)

Required Readings: Falk & Dierking 2007; Stocklmeyer et al 2010**Suggested Readings:** Bell et al 2016; Bevan et al 2010; NASEM 2017, Sacco et al 2014*Week 2: Informal Education Venues (e.g., aquaria, museums, zoos, field stations)*

- What do different venues offer participants?
- How similar/different are these venues?

Required Readings: Struminger et al 2018; Schwan et al 2014**Suggested Readings:** Falk & Dierking 2012*Week 3: Informal Learning Activities, Relevant Pedagogies and Frameworks (e.g., community events, hands-on workshops, discovery-oriented exhibits, citizen science data collecting, instructional hikes with a service component)***Required Readings:** Varner 2014; Bonney et al 2009a**Suggested Readings:** NRC 2009; NASEM 2018, Bonney et al 2009b*Weeks 4 & 5: Assessing Implementation in Informal Contexts and Evaluating Learning in Informal Contexts*

- In what ways does pedagogy matter for assessment and evaluation?
- How does science benefit? (e.g., science literacy, quality big data, new directions/innovation)
- What does quality implementation look like? (e.g., participation, products, return visits)
- What impact does/could ISE have on participants of all ages? (e.g., science literacy, 6 science strands)

Required Readings Week 4: CAISE 2011; Jordan et al 2012**Required Readings Week 5:** Lesen et al 2016; Pugh and Girod 2007**Suggested Readings:** Phillips et al 2017**End of Part I: ISE Synthesis Paper**

Students must demonstrate their understanding of ISE theories and creatively explore what a successful Outreach event might look like based on the ISE literature (1,000 -1,500 words).

Part II: Public and Policy Impacts (6 weeks)

Week 6: What is the potential for informal learning to affect individual and community behaviors, as well as science research?

Required Readings: Freitag & Whiteman 2016, Riesch & Potter 2014

Suggested Readings: Falk & Dierking 2010

Week 7: What is the potential for informal learning to affect public support of government policy (especially in the areas of conservation, natural resource management, and environmental protection)?

Required Readings: Nadkarni 2013; Newman et al 2017; Chase & Levine 2016; McKinley et al 2017 (Select 2)

Suggested Readings: Ellwood et al 2017

Week 8: Science outreach among skeptics; when scientific credibility is questioned or appears biased

Required Readings: Hardy 2019; Ross et al. 2018

Suggested Readings: TBD

Weeks 9 & 10: What is the potential for informal learning to affect your research and vice versa? (2 weeks – students ID readings for discussion related to their project ideas)

Required Readings Week 9: TBD

Required Readings Week 10: TBD

Suggested Readings: Salguero-Gomez et al. 2009

Week 11: Project design and evaluation

Required Readings: Shirk et al 2012; Phillips et al 2014

Suggested Readings: review CAISE 2011

End of Part II: ISE Project Design

Students must design a project that can be implemented by the end of the course and has the potential to affect public attitudes or knowledge (this will be implemented in part 3 of the class). The project must have an evaluation component and implementation venues identified and ideally secured for Part III.

Part III: Educating the Public (Weeks 12 – 15; 4 weeks)

Approved projects can be implemented at an outreach event (e.g., a science fair) or ISE venue (e.g., a museum) at any point during Part 3 of the course. The outreach must incorporate evaluation.

Weeks 12 – 14: Use class time to review classmates' projects – proposed or completed. Outcomes and evaluations will be discussed as projects are implemented.

End of Part III/Final: Submit an evaluation of the implemented project. What succeeded? Why? What could have been done better? Make recommendations (1,000 - 1,500 words).

Notice

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services, currently located in the Disability Services building at the Student Services at White Creek complex on west campus or call 979-845-1637. For additional information, visit <http://disability.tamu.edu>.

Honor Code

“An Aggie does not lie, cheat or steal, or tolerate those who do.” (www.tamu.edu/aggiehonor)

Readings/Bibliography

- Bell, Jamie, John Falk, Roxanne Hughes, Geoff Hunt, Julia Parrish, Monya Ruffin, Kalie Sacco, and Grace Troxel. 2016. "Informal Stem Education: Resources for Outreach, Engagement and Broader Impacts." *Science Education (CAISE)*.
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Resources:

http://www.nisenet.org/search/product_type/programs-and-activities-10