

Informal Science Education - Learning and Teaching Science Outside the Classroom

Course number: 11:300:335
Day/Time: Tuesdays, 12:35 - 3:35 pm
Location: Lipman Learning House

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Course Description

What is the course about? This course focuses on the teaching and learning of science in out-of-school contexts. These contexts are widely referred to as “informal learning” contexts and include: zoos, aquariums, science centers, natural history museums, docent-led walks/tours, after-school programs, and eco/enviro-tours. As part of this course, we will read and discuss literature on informal science education (ISE). Learning theory in this area draws heavily from socio-cultural perspectives on knowing and learning and we will discuss its influence, along with cognitive and educational psychology, on the teaching and learning of science in out-of-school contexts.

Who should take this course? Undergraduate students who are interested in a possible career working in any of the various informal science education settings described above or undergraduates interested in education that goes beyond classroom settings. This course is appropriate for undergraduate students in the School of Env. and Biological Sciences science education minor or the Graduate School of Education minor in education.

What will students learn? Students will gain an appreciation for the vast array of places where people are taught and learn science that fall outside the traditional classroom. You will develop a rich understanding of the how to design informal learning experiences that lead to deeper scientific understanding, including effective field trip approaches, exhibit design considerations, and program development ideas. This course will expose you important aspects of informal science learning such as: the various types of ISE experiences; methodologies for assessing informal science learning; issues of diversity, equity, interests, motivation; development of school-ISE context partnerships; and emerging topics such as new media, and life-long learning.

How will students learn this material? The course uses several research-driven approaches to teach the material through a combination of readings, discussions, mini-lectures, hands-on activities, writing exercises, group projects, and two field trip experiences. Four major components lay the foundation of the course. These

components are: (1) readings designed to provide an overview of topical ideas coupled with class discussion and activities designed to provide concrete examples; (2) observations of learning and teaching in ISE settings to provide real-world, hands-on learning experiences; (3) a literature review paper pertaining to a student-chosen topic around ideas of ISE learning in out-of-school contexts, and (4) a project around the design of an ISE experience.

Course Structure and Assignments

The course will follow a combination of seminar-style format, meaning we will read and discuss literature on the topic, and hands-on activities and experiences. Students will engage in several semester-long activities designed to enhance their understanding of the teaching and learning of science in informal settings.

Participation: Your participation in class counts heavily towards your grade. It is therefore ***important that you are present and actively participate in class*** activities and discussions. Learning is an active process: the more you participate the more you learn. As part of your participation, you are expected to actively engage in class discussion, group work activities and online. In addition, class participation involves the discussion of assigned readings and attending class as described further below.

- **Readings/Prompts:** There will be assigned readings for each class session; you are expected to read them and be prepared to discuss them in class. You are expected to reply to a Reading Prompt on Sakai on a weekly basis. These Prompts are designed to help you get the most out of the reading. On occasion an additional reading may be assigned or a new reading may be substituted for an existing one.
- **Attendance:** You are expected to attend all class sessions. However, it is expected that, as adults, life sometimes throws curve balls that require you to be in attendance somewhere other than my class. You will be allowed **one** excused absence (meaning, you will not have to conduct “make up” work for that class) but it is expected that you will read all materials, post to Sakai as necessary, hand-in all work, and be responsible for all course content **even if you are absent**. Other absences can be negotiated on a case-by-case basis. If, at any time, you know you will be absent, please contact me prior to class if possible.
- **Literature review paper:** All students will write a paper on a topic of their choosing as it relates to informal science learning. This will be a 5-7 page (double-spaced, 12pt font, New Times Roman, 1” margins), literature review-style paper. You will be expected to find original literature on your topic of choice. Specific details about the paper will be handed out in class.
- **Informal Learning Observations:** All students will conduct 3-6 hrs. of informal observations outside of class time. You will be provided with methodologies for conducting your observations and a list of venues, both locally on/near Rutgers’ campus and others within close proximity to Rutgers. These observations are considered “homework,” are conducted outside of official class time, and are

required. We will also take at least two class field trips to conduct observations at a science center, natural history museum, aquarium, or the like. Field trip attendance is mandatory. You are to keep an Observations Journal, either on paper or electronically, that can be reviewed for a grade.

- **Projects:** Students will be able to choose one of the following projects to be completed by the end of the semester. You will submit a write-up of your project at the end of the semester and present it to your classmates on the last day of class. These options are:

1. Following a 3-phase model, you team will create a coherent school field trip experience on a topic of your choice and aimed at a grade (or grade range) of your choice. You will not need to conduct the field trip.

2. After researching a topic, you will design an exhibit that could be used in an ISE context (you do not need to build it, but you can if you'd like!).

3. You will create an ISE program. First you'll need to decide what kind of program (after-school, eco/enviro-tourism, docent-led program, museum public program, museum school program, ...). Then you'll choose a topic and design your program.

- **Individual reflection paper:** The last assignment of this course is an individual reflection paper 3 pages long (double-spaced, 12pt font, 1" margins) in which you (individually) reflect on what you have learned in this course. This reflection should be based on the contribution of the readings, class activities, and final project to your developing understanding of what it means to teach and learn science in informal contexts.

- **Electronic Submissions:** If you wish to submit your document electronically, please do so via the Sakai Drop Box Tool (do not email me your paper) in MS Word (.doc) format. **Please do not submit other file types.** Label the file with your name (first name and initial of last) and assignment name (e.g., reflection). For example, a literature review paper by me would be JessicaBLitReview.doc. **Make sure your name is also on the assignment.**

Specific instructions for assignments (listed and not listed) will be provided in class closer to the assignment due date.

Care, respect and integrity in written and classroom exchanges: All written work, including postings on Sakai, should be proofread for clarity, spelling, grammatical errors and the like. Please use language that is appropriate for the classroom setting and maintain a professional tone in both your Sakai postings and classroom discussions.

Assignments should be your own work, except in cases where I have required a group product. Please do your own work and cite your sources. Outside sources should be referenced appropriately (either APA or Chicago style is acceptable). You should not turn in the same work in two separate classes without the specific written approval of the faculty members involved. Violations of academic integrity have

serious consequences for your grade, your academic future and your career. Please familiarize yourself with the university policy on academic integrity: <http://academicintegrity.rutgers.edu/integrity.shtml>.

Grading:

<u>Assignment</u>	<u>Tentative due date</u>	<u>Grade</u>
Participation	Throughout the course	15%
Reading Prompts	Throughout the course	5%
Observations	Throughout the course	20%
Literature Review Paper	Week 13	25%
Projects	Week 14	30%
Individual reflection paper	On exam day	5%

Books/Readings:

Required –

Books

Bell, P., Lewenstein, B., Shouse, A.W., & Feder, M.A. (Eds.). (2009). *Learning science in informal environments: People, places, and pursuits*. Washington, D.C.: National Academies Press. (Available at: http://www.nap.edu/catalog.php?record_id=12190)

PDFs

Available as necessary on the course Sakai site under Resources, Readings

Recommended -

Hein, G. (1998). *Learning in the museum*. New York, NY: Routledge.

Falk, J.H. and Dierking, L.D. (2000). *Learning from museums: Visitor experiences and the making of meaning*. Lanham, MD: AltaMira Press.

Weekly Syllabus:

Week 1 - Sept. 6: Course Introduction

Topics: syllabus, course requirements, etc.; basic intro to informal learning, disputed definitions, readings

Assignment(s) to complete prior to this class

none

Week 2 - Sept. 13: What is Informal Learning?

Topics: history, constructivism outside schools, factors (context, authority, agency, motivation, experiential)

Assignment(s) to complete prior to this class

Readings:

Bell, et al., (2009) - Chapters 1-2.

Supplemental Readings:

Falk and Dierking (2000). Learning from museums, Ch 1 - Introduction

Activities:

Reading Reflection Prompt

1st Informal Learning Observation Assignment

Due in class:

***** 1st Informal Learning Observation *****

Week 3 - Sept. 20: Interpretation, Communication, Education

Topics: difference between Interpretation, Communication, and Education from theoretical and practical standpoints

Assignment(s) to complete prior to this class

Readings:

Beck, L. (2002). Interpretation for the 21st Century: Fifteen Guiding Principles for Interpreting Nature and Culture, Ch. 1.

Hein, G.E. (1998). Learning in the museum, Ch. 8 - The Constructivist Museum.

Activities:

Reading Reflection Prompt

Due in class:

nothing

Week 4 - Sept. 27: Types of ISE Engagement

Topics: socio-cultural perspective, power of description

Assignment(s) to complete prior to this class

Readings:

Ellenbogen, K. (2002).

Activities:

Reading Reflection Prompt
Observation Assignment #2

Due in class:

***** Informal Learning Observation #2 *****

***** One paragraph about your group's ideas for your class Project. Where (type of informal learning context) will you focus this work? What will be your target audience? If a school-led project, what grade level will your project target? What content topic will be the focus? What resources might you need? *****

Week 5 - Oct. 4: Designed Spaces (held Oct. 8, during AMNH field trip)

Topics: design considerations, object/learner/message oriented design in science centers, zoos, aquariums, natural history museums...

Assignment(s) to complete prior to this class

Readings:

Bell, et al., (2009) - Chapter 5 - Science Learning in Designed Spaces.

Eberbach & Crowley. (2005). From living to virtual: Learning from museum objects. *Curator*, 48(3), 317-338.

Activities:

Reading Reflection Prompt
Observation Assignment #3

Due in class:

nothing

Week 6 - Oct. 11: School-based Field Trips

Topics: lesson planning, effective leading of trips, pre-visit-post design approach

Assignment(s) to complete prior to this class

Readings:

Melber, L.M. (2007). Informal Learning and Field Trips: Engaging Students in Standards-Based Experiences Across the K-5 Curriculum

Activities:

Reading Reflection Prompt
Finish Project Proposals

Due in class:

***** Informal Learning Observation #3 *****

Week 7 - Oct. 18: Assessment/Evaluation

Topics: experiential learning theory, object learning theory

Assignment(s) to complete prior to this class

Readings:

Bell, et al., (2009) - Chapter 3 - Assessment

Activities:

Reading Reflection Prompt

Due in class:

nothing

Week 8 - Oct 25: Family Learning

Topics: mediation by family

Assignment(s) to complete prior to this class

Readings:

Bell, et al., (2009). Ch 4 - Everyday Settings and Family Activities.

Activities:

Reading Reflection Prompt
Observation Assignment #4

Due in class:

***** Project Proposals To Be Handed In Today *****

***** Informal Learning Observation #4 *****

Week 9 - Nov. 1: School-Museum Partnerships (held Nov. 5, Env. Ed. field trip)

Topics: how to establish good working relationships

Assignment(s) to complete prior to this class

Readings:

DeWitt, & Osborne, J. (2007). Supporting teachers on science-focused school trips: Towards an integrated framework of theory and practice. *International Journal of Science Education*, 29(6), 685-710.

Activities:

Reading Reflection Prompt

Due in class:

nothing

Week 10 - Nov 8: Interest, Attitudes, and Identity

Topics: how do interest, attitudes, and identities of learners affect student ISE learning

Assignment(s) to complete prior to this class

Readings:

Packer, J. & Ballentyne, R. (2002). Motivation factors and the visitor experience: A comparison of three sites. *Curator*, 45(3), 183-198.

Activities:

Reading Reflection Prompt

Due in class:

nothing

Week 11 - Nov 15: Diversity and Equity

Topics: how can we provide quality ISE experiences for all learners

Assignment(s) to complete prior to this class

Readings:

Bell, et al., (2009) - Chapter 7 - Diversity and Equity

Activities:

Reading Reflection Prompt
Observation Assignment #5

Due in class:

***** Informal Learning Observation #5 *****

Nov. 22 - * NO CLASS *** (RU calendar- Thurs Classes instead of Tues)**

Week 12 - Nov. 29: Environmental and Eco-tourism

Topics: ISE learning opportunities during environmental and eco-tourism

Assignment(s) to complete prior to this class

Readings:

TBD

Activities:

Reading Reflection Prompt

Due in class:

nothing

Week 13 - Dec. 6: Emerging Topics - New Media; Citizen Scientists.

Topics: Web 2.0, mobile devices, museum technology; citizen science as ISE learning

Assignment(s) to complete prior to this class

Readings:

Bell, et al., (2009) - Chapter 8 - Media

CAISE. (2009). *Public participation in scientific research: Defining the field and assessing its potential for informal science education*. Washington, D.C.: Center for Advancement of Informal Science Education.

Activities:

Reading Reflection Prompt

Due in class:

***** Literature Review Paper Due in Class *****

Week 14 - Dec. 13: Project Presentations

Readings:

none

Activities:

Finish your project write-up and prepare your presentation

Due in class:

***** Project Papers due in class *****

NOTE - Individual reflection papers due on day of exam - Date TBD