FYS 117 - Demonstrating Science
Lafayette College, Fall 2019

Professor

Professor: Dr. Zoe Boekelheide

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Office hours: MW 2-4pm

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Course information

Course meeting time: Mon 12:10-2pm and WF 1:10pm-2pm in HSC 017

Writing Associate: TBD

Pardner: TBD

About this course

Science demonstrations are a fixture in classroom science lessons from elementary school through college. Demonstrations move scientific concepts from the abstract to the concrete, and can help students develop physical intuition. Demonstrations are also commonly utilized in science museums or outreach programs as marketing tools to convince young people to pursue STEM (science, technology, engineering and mathematics) fields, because they are fun! The availability of fast internet and video now means that many complex or expensive science demonstrations are

accessible virtually by almost anyone with a computer and internet connection. Yet studies show that simply viewing a scientific demonstration does not mean that viewers understand the intended scientific concept. In fact, viewers often come away with incorrect interpretations of the phenomena they have witnessed, or even "remember" seeing something that did not occur. In addition, many demonstrations include much more complicated science than advertised. This course will include a number of scientific demonstrations and students will consider multiple explanations for the demonstrated phenomena. Students will find resources to support or eliminate these explanations. Class discussions will cover scientific concepts, the goals of scientific demonstrations, and the success or failure of demonstrations at meeting those goals.

First-Year Seminar Program

From the College Catalog, "The First-Year Seminar, which is required of all students, is designed to introduce students to intellectual inquiry through engaging them as thinkers, speakers, and writers. Each seminar focuses intensively on a special topic that is articulated with related cocurricular activities. Limited to approximately 16 students per section, the First-Year Seminar includes significant reading, writing, discussion, and presentation and is affiliated with the College Writing Program. Students are also introduced to use of the library for research."

First-year seminars are officially designated Writing (W) courses and typically include a significant amount of process writing - e.g. writing of drafts, editing, and rewriting. We will also have a class presentation project. Our class will have a Writing Associate (WA); each student will meet with the WA at least four times during the semester for feedback on editing papers and practicing the presentation project. We will also have two meetings with a librarian as an introduction to library research.

Communication with Prof. Boekelheide

In person: Office hours are set times when I make sure I am available in my office to meet with students on a drop-in basis. You may stop by any time during these hours and talk with me or ask a question. I expect to see every student in my office hours at some point during the semester! You can try stopping by my office at times outside my office hours, but I may not be available to meet with you. You can also e-mail me to set up another meeting time if my office hours don't work for you.

By e-mail: I check e-mail regularly. If you e-mail me, you should expect to hear back from me within 24 hours Mon-Fri (barring travel or other circumstances). Likewise, I will use e-mail to notify the class of reminders, weather cancellations, assignment clarifications, etc. You should check your e-mail every day, and perhaps more frequently if you suspect weather cancellations, to ensure you receive these communications.

Course Website

We will use moodle, `http://moodle.lafayette.edu`. When I send email to the class, I typically use moodle, so make sure to check the e-mail address associated with moodle. I will also post

readings and important class documents on moodle.

Course Objectives

The primary objectives of this course are twofold. First, specifically related to this course's content, the objective is for you to gain an understanding of how humans understand and communicate scientific principles. Secondly, related to the broader first-year-seminar program, the objective is for you to gain skills in writing, communicating, and otherwise demonstrating your ideas.

Learning Outcomes

After completing this course, you will be able to....

- Discuss scientific phenomena covered.
- Recognize what aspects of a particular phenomenon you understand or don't understand.
- Find resources to improve your understanding.
- Write about scientific phenomena.
- Present a scientific demonstration.

In addition to the outcomes listed above, as a first-year seminar, this course will accomplish the following outcomes associated with FYS in the Common Course of Study:

- FYS1. Demonstrate critical thinking strategies related to interpretation and evaluation of texts (verbal, visual, or performative) in the context of course materials.
- FYS2. Identify and consider ones assumptions, thereby building informed perspectives.
- FYS3. Information literacy:
  - FYS3a. Identify and use information relevant to a specific purpose or goal.
  - FYS3b. Employ effective search strategies to locate useful information.
  - FYS3c. Access and use information ethically and legally.

Readings

For this course, you are required to obtain the following books:

- K. C. Cole, Something Incredibly Wonderful Happens: Frank Oppenheimer and His Astonishing Exploratorium, University of Chicago Press (2012).
  ISBN-10: 9780226113470
  ISBN-13: 978-0226113470

- Christopher Chabris and Daniel Simons, The Invisible Gorilla: And Other Ways Our Intuitions Deceive Us, Crown (2010).
  ISBN-10: 0307459667
  ISBN-13: 978-0307459664

- Andrew Shtulman, Scienceblind: Why Our Intuitive Theories About the World Are So Often Wrong, Basic Books (2017).
  ISBN-10: 0465053947
  ISBN-13: 978-0465053940

- Andrea A. Lunsford, The St. Martin's Handbook, Bedford/St. Martin's (2017).
  ISBN-10: 1319120261
  ISBN-13: 978-1319120269
  -The College Writing Program asks that you purchase this book and keep it for your entire college career. You will take at least 3 more writing courses at Lafayette, and this book is a helpful resource.
  -Skillman Library keeps a copy of this book available as reference material.

- Additional readings will be posted on the course Moodle site and distributed in class.

Grades

Grades on various assignments serve multiple purposes:

- To provide feedback on your performance on given assessments (e.g. papers, presentations). Ideally, your performance on such assessments reflects your understanding of the material, i.e. the degree to which you have met learning outcomes.
- To provide more immediate incentives for certain behaviors which are beneficial to your learning (e.g. attending class, completing assignments on time) or to the class as a whole (e.g. participating in class discussions).

Here are some things that grades are completely irrelvant to:

- Your value as a human being.

Your final course grade will be determined as follows:

Class participation and preparedness	20%
Paper 1 (3-4 pages)	10%
Paper 2 (6-7 pages)	20%
Presentation proposal (5 pages)	15%
Presentation reflection (5 pages)	15%
Presentations	20%

Detailed description of course components

Class attendance and participation

This is a seminar course. You are expected to complete required readings before each class meeting so you are prepared for in-class discussions every class meeting. Active participation is required. Brief assignments (in or out of class, announced or unannounced) may be used to gauge preparedness and will be incorporated into this grade. Class attendance is required. If you must miss a class because of athletic commitments or illness, please contact me.

There will be two special sessions of our class taking place in the library, with a librarian. The dates are **Sept. 4, 2019** and **Sept. 11, 2019**. On these days, please report to **Skillman 003** at our regular class time.

Paper 1

Paper 1 has an expected length of 3-4 pages double-spaced (∼750-1000 words). This paper will analyze a science demonstration of your choosing and may include figures. See the assignment description for further details.

A figure may count towards the page count (fully or partially), but ONLY if you generate the figure yourself and it contains important information which adds to the paper and is not redundant to the text. (Making good figures is an important component of scientific writing and communication, and it can easily take more time and effort than writing text).

Each paper will undergo the draft and revision process. A draft of each paper will be due at least one week before the final due date. The draft must be full length and complete enough to receive valuable feedback for your revision. You will have a conference with our WA about each of these drafts. You MUST attend your conference with the WA. I will not grade the final paper if you have not met with the WA. You will also each help a classmate by reading and providing feedback on their paper (peer review).

Timeline for Paper 1 submission:

Paper 1:

Draft due	Mon Sept 9
Peer review in class	Mon Sept 9
Final draft due	Mon Sept 16

Paper 2

Paper 2 has an expected length of 6-7 pages (∼1500-1750 words). Paper 2 will analyze a science-related video, video series, or channel of your choosing. The format will be similar to Paper 1. See the assignment description for further details.

Paper 2:

Draft due	Mon Oct 7
Peer review in class	Mon Oct 7
Final draft due	Weds Oct 16

Presentations

Our class has partnered with a local fifth-grade class. We will work together on two dates in November.

First, you (FYS class) will design and present an 80-min long workshop on science topics for the fifth-grade class on **November 18(?)**. You MUST be here for this presentation! This presentation will include scientific demonstrations and hands-on activities. Second, we (FYS class) will visit our fifth-grade class at their elementary school on **November 25(?)** and guide the students through a hands-on project. You (FYS students) will design both experiences with input from Prof. Boekelheide and our fifth-grade class's teacher. One meeting with the WA will be reserved for practice.

This will be a group project and the class will determine each student's individual roles. Two individual papers will be associated with this presentation project: a planning/proposal paper before the presentation, and a reflection paper afterwards. The timeline is below:

Presentation proposal:

Draft due	Mon Oct 28
Peer review in class	Mon Oct 28
Final draft due	Mon Nov 4

Presentations:

Practice presentation	Nov 11(?)
Actual presentation	Nov 18(?)
Practice workshop	Nov 22(?)
Actual workshop	Nov 25(?)

Presentation reflection:

Draft due	Fri Dec 6
Peer review in class	Fri Dec 6
Final draft due	Fri Dec 13

Intellectual honesty

From the Lafayette Student Handbook:

> To maintain the scholarly standards of the College and, equally important, the personal ethical standards of our students, it is essential that written assignments be a students own work, just as is expected in examinations and class participation. A student who commits academic dishonesty is subject to a range of penalties, including suspension or expulsion. Finally, the underlying principle is one of intellectual honesty. If a person is to have self-respect and the respect of others, all work must be his/her own.

You are expected to abide by the principles of intellectual honesty outlined in the Lafayette Student Handbook (available from http://studentlife.lafayette.edu). Please read through the Handbook and make yourself aware of the College's expectations.

Any writing you submit for this course must be your own, with the exception of quotations used with appropriate references. Any drawings, photos, or figures used in submitted writing must

be your own or be credited appropriately. If you are unsure of what constitutes plagiarism or appropriate citation, please ASK me, either in class or privately.

Accommodation

It is important to me that nothing impedes your ability to do well in this course. If you have any disabilities which you feel may interfere with your ability to succeed and prosper in this class, please contact me to discuss ways of accommodating them.

Mandatory statement for any Lafayette course with a disability policy. In compliance with Lafayette College policy and equal access laws, I am available to discuss appropriate academic accommodations that you may require as a student with a disability. Requests for academic accommodations need to be made during the first two weeks of the semester, except for unusual circumstances, so arrangements can be made. Students must register with the Office of the Dean of Advising and Co-Curricular Programs for disability verification and for determination of reasonable academic accommodations.

Mandatory Moodle privacy statement

Moodle contains student information that is protected by the Family Educational Right to Privacy Act (FERPA). Disclosure to unauthorized parties violates federal privacy laws. Courses using Moodle will make student information visible to other students in this class. Please remember that this information is protected by these federal privacy laws and must not be shared with anyone outside the class. Questions can be referred to the Registrar's Office.

Mandatory credit hour statement

The student work in this course is in full compliance with the federal definition of a four credit hour course. **The federal course credit rule requires a total of 180 hours (12 hours/week) of student work over an approximately 15-week semester for a full unit (four credit hour) course.** Please see the Registrars Office web site: (https://registrar.lafayette.edu/wp-content/uploads/sites/193/2013/04/
Federal-Credit-Hour-Policy-Web-Statement.doc) for the full policy and practice statement.

Schedule for Lafayette Fall 2019 FYS117 course (subject to change)

Prof. Zoe Boekelheide

Class	Week	Date	Reading due	Discussion topic	Assignments due
1	1	26-Aug		Why are we here?	
2		28-Aug	Syllabus, Scienceblind (SB) Ch. 1; Galileo reading assignment	Science denialism, misconceptions	
3		30-Aug	Scienceblind Ch. 5; Handout - Giancoli p. 54-55	Writing; Assignment 1; Motion	
4	2	2-Sep	Scienceblind Ch. 12	Discuss topics for paper & adaptation	Think of topic for Paper 1
5		4-Sep	St. Martin's Handbook Ch. 1-2 and 3g	**Library session - Skillman 003**	
6		6-Sep	Scienceblind Ch. 13	Evolution	
7	3	9-Sep	St. Martin's Handbook Ch. 4	Peer feedback in class; video assignment	Paper 1 draft
8		11-Sep	St. Martin's Handbook Ch. 11-12, 35	**Library session - Skillman 003**	
9		13-Sep	Cohen article - Wikipedia, the "good cop" of the internet	Credibility of sources	
10	4	16-Sep	Scienceblind Ch. 3; Also google "phonons"	Energy	Paper 1 final
11		18-Sep	Scienceblind Ch. 14	Wrap up Scienceblind	
12		20-Sep	Exploratorium Ch. 1	Video discussions	Group 1 prepare discussion
13	5	23-Sep	Exploratorium Ch. 2	Video discussions	Group 2 prepare discussion
14		25-Sep	Exploratorium Ch. 3	Video discussions	Group 3 prepare discussion
15		27-Sep	Exploratorium Ch. 4	Video discussions	Group 4 prepare discussion
16	6	30-Sep	Exploratorium Ch. 5	Video discussions	Group 5 prepare discussion
17		2-Oct	Exploratorium Ch. 6	Exploratorium	
18		4-Oct	Exploratorium Ch. 7	Exploratorium	
19	7	7-Oct		Peer feedback in class	Paper 2 draft
20		9-Oct	Exploratorium Ch. 8	Exploratorium	
21		11-Oct	Exploratorium Ch. 9	Exploratorium	
	8	14-Oct	**Fall break**		
22		16-Oct	Exploratorium Ch. 10	Exploratorium	Paper 2 final
23		18-Oct	Exploratorium Ch. 11 & 12	Exploratorium	

24	9	21-Oct	Look through Scientific American website (or other sources) for ideas	Meet with presentation groups	
25		23-Oct	Invisible Gorilla Ch. 1	Attention	
26		25-Oct	Invisible Gorilla Ch. 2	Memory	
27	10	28-Oct		Proposal peer feedback	Proposal draft
28		30-Oct	Invisible Gorilla Ch. 3	Confidence	
29		1-Nov	Invisible Gorilla Ch. 4	Knowledge	
30	11	4-Nov		Meet with presentation groups	Proposal final
31		6-Nov			
32		8-Nov			
33	12	11-Nov	**Practice presentation II**		
34		13-Nov			
35		15-Nov			
36	13	18-Nov	**Presentation I: Cheston students to Lafayette**		
37		20-Nov			
38		22-Nov	**Practice presentation II**		
39	14	25-Nov	**Presentation II: Lafayette students to Cheston**		
		27-Nov	**Thanksgiving break**		
		29-Nov	**Thanksgiving break**		
40	15	2-Dec	Invisible Gorilla Ch. 5		
41		4-Dec	Invisible Gorilla Ch. 6 and Conclusion		
42		6-Dec		Peer feedback in class	Reflection draft

Finals wk	13-Dec			Reflection final