

**SOCIOLOGY 223**  
**Scientific Literacy in the Post-Truth Era**  
**SPRING 2018**

**Instructor:** Lauren Valentino

**Day and time:** T, Th 2:00-3:50pm

**Location:** Soc/Psych 141

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**Office Hours:** T, Th 4:00-5:00pm, Soc/Psych 135

## Overview and Objectives

In this course, we will develop a critical understanding of the scientific process, learn to distinguish “good” science from “bad” science, evaluate how science and scientific arguments are (mis)interpreted and (mis)used in journalism and social media, and interrogate the way we use scientific evidence in our everyday lives.

We will focus on science and scientific arguments that are made about the social world (e.g. sociology and social science; politics, law, and public policy; business; and epidemiology and public health). We will use social science insights to examine the social processes that influence the production of science and its reception by society. The course will provide foundational knowledge on research design, methodology, and fundamental theoretical concepts in statistics. No prior research methods course or statistics experience is required.

In the first part of the course, we will learn about the scientific process from a critical perspective and consider when and why science gets politicized. In the second part of the course, we will outline the philosophies underlying how we generate knowledge, test theories, and come up with new ones, and we will see how the scientific process is a thoroughly social one. In the third part of the course, we will take a closer look at the first stage of the scientific process: choosing what data to collect and how to measure those data, and how this step in the process can influence the conclusions we draw in a study. In the fourth part of the course, we will consider the analysis stage of the scientific process: how we make arguments about when one thing causes another, and how the way we go about doing that can influence our findings. In the fifth and final part of the course, we will examine the interpretations we draw from scientific studies, and how these are often misunderstood in systematic ways. The goals of this course are as follows:

- To provide students with an understanding of the scientific process
- To foster students’ critical and abstract thinking skills by pinpointing ways that this scientific process can go awry
- To facilitate students’ capacity to critique logical flaws in scientific research or in the ways scientific research is represented by others

- To develop students' awareness of the way power, inequalities, and other social phenomena can influence knowledge production
- To encourage students to engage with viewpoints that differ from their own
- To teach students how to communicate complex ideas in a way so that they will be understood by people from different backgrounds

**This course asks students to engage in the following Modes of Inquiry:**

- Cross Cultural Inquiry
- Ethical Inquiry
- Science, Technology, and Society

## Requirements

You are expected to read, watch, or listen to the course material assigned for that day's course *before that course meets*. This is because we will discuss the material on that day, and I expect you to be personally responsible for knowing and critiquing the information provided about the course topic that day.

This course is a mix between lecture and discussion. At the beginning of each class, I will go over any concepts from the readings that students have difficulty with or wish to clarify. Then we will discuss how these issues relate to actual science and the production and dissemination of knowledge. These discussions are engagements among members of the course - I facilitate these, I do not lead them - which means it is up to you to refute and support each other's point of view. Your engagement in these discussions forms the basis for the "class participation" portion of your performance in this course. I will keep track of your presence/absence and your verbal participation each class period, often using clickers. Keep in mind that your **in-class participation** comprises 10% of your final grade.

In order to prepare you for in-class discussions, you will complete a brief reading response each class period via the Sakai forum for the weeks marked with an asterisk (\*). I will either ask you about the "big picture" or a guiding question tying together the readings (Unit 1) or will ask you to apply the methodological/statistical concept to a scientific/journalistic study for that class (Units 2-5). The response should be at least 300 words. *The Sakai forum will close at 9 am on the day of that class period, so you must have your reading response for that day posted before then, or you will not receive credit.* Altogether, these **reading responses** comprise 25% of your final grade.

There is a **midterm exam** that will be administered in class before Spring Break. You will be responsible for knowing all the material we have covered up to that point. The exam will contain multiple-choice and short-answer format questions. The midterm exam comprises 15% of your final grade.

There is a **group project** in which you will work with a group of 4 to create a video that presents an in-depth look at one particular scientific finding that turned out to be incorrect or inaccurate but gained traction nonetheless among the media, mainstream audiences, or

policy-makers. On Sakai you will find a list of the available topics, as well as specific instructions for what is expected in this group project and the rubric by which you will be graded. Your group members will be randomly assigned. You will be asked to post these video projects on the Sakai site before the last day of class (Wednesday, April 25). We will hold a viewing party to watch them during reading period (attendance at the viewing party is optional but will give you extra credit). Each group member will evaluate the others' contributions so as to encourage an even distribution of work among group members. You will submit this information via a form on Sakai. This group project comprises 25% of your final grade.

There is a 3-5 page **final paper** due on the day during which our final exam is scheduled (date TBD). In this paper, you should select one scientific paper, long-form newspaper article/blog piece or popular science or mainstream book (can be just one chapter of that book) that makes a social science-type argument and which you analyze from the perspective of this course. There is a list of options on the Sakai site - I encourage you to select your own piece/book, but if you go this route, you *must* confirm your choice with me before you start the paper! You can find more specific instructions on Sakai for what is expected in this paper as well as the rubric by which you will be graded. I encourage you to come to my office hours to discuss your final paper before writing it. I will *not* read drafts of your paper, but I will be happy to advise you on your ideas. This final paper is worth 25% of your final grade.

## Grades

Your grade in this course will be based on the following:

- In-class participation - every class period - 10%
- Reading responses - due 9 am the day of every class period which is starred (\*) on the syllabus - 25%
- Mid-term exam - last class before Spring Break - 15%
- Group project - due on LDOC - 25%
- Final paper - due on date of final exam - 25%

### Grading scale:

- **A+** 97-100
- **A** 93-96.9
- **A-** 90-92.9
- **B+** 87-89.9
- **B** 84-86.9

- **B-** 80-83.9
- **C+** 77-79.9
- **C** 74-76.9
- **C-** 70-73.9
- **D** 60-69.9
- **F** 0-59.9

**Extra credit opportunity:** One opportunity for extra credit will be available in this course. This extra credit assignment is optional, but no further chances to improve your grade will be offered.

We will hold a viewing party to watch the group project videos between LDOC and reading week. Your attendance at this party will earn you up to a maximum of 10 points (which may be adjusted depending on total participation points are available in class; basically, it should be enough to bump you from a B- to B, for example, but won't make a C into an A).

If you cannot attend the viewing party, you can instead choose to watch the videos on your own during Reading Week. After watching all of the videos, fill out the Group Video Reaction assignment (available on Sakai), which can then be submitted to me by midnight on the last day of Reading Week.

## Attendance and Deadline Policy

This class emphasizes class discussion and participation, meaning attending class is critical. Students must notify the instructor in advance if they will miss class. No absences will be excused without email submission of the forms required as per Duke policies, including the [Notification of Varsity Athletic Participation \(NOVAP\) form](#), [Religious Observance Form](#), [Short-Term Illness Notification Form \(STINF\)](#), official notification of a job interview, or other official Duke forms available for emergencies. Further information on Duke's policies regarding missed classes can be found [here](#). Students are responsible for getting materials from missed classes.

Work turned in after posted due dates or missed during unexcused absences will receive a zero. Should students miss an exam, they must provide required documentation for their absence according to the guidelines above and arrange to take a make-up exam outside of class time as soon as possible after the exam date.

## Laptop & Phone Policy

We will engage with lots of different kinds of material in this class - such as videos, comic strips, live polls, and interactive websites. This means you will need a laptop, tablet, or phone for class. Please bring one of these to each class period. However, you are permitted to use this technology *during designated times only*. This means that you *may not* use your

laptop, tablet, or phone at any other time in class. I will be very strict about enforcing this. Violating this policy will result in a 0 for participation for that day.

## Academic Integrity

You are expected to act in accordance with Duke's **Community Standard**. Violations of this policy include, but are not limited to cheating (intentionally using or attempting to use unauthorized materials, information, or study aids in any academic exercise) and plagiarism (knowingly *or* unknowingly representing the words of another as one's own in any academic exercise). Violations of the Duke Community Standard will be reported to the Office of Student Conduct.

## Commitment to Diversity

Duke is committed to fostering an inclusive and diverse community. This is also a personal commitment that I take very seriously and expect each of you to undertake as well. That means our classroom will be a place where everyone - regardless of race, gender, age, ethnicity, cultural heritage or nationality; religious or political beliefs; sexual orientation or gender identity; or socioeconomic, veteran or ability status - has the right to inclusion, respect, agency, and voice. If there is anything I can do to ensure that the course and/or class meets this standard in your case, please reach out to me via email or by visiting me during my office hours.

## Required Texts

- Neuman, W. Lawrence. 2016. *Social Research Methods: Qualitative and Quantitative Approaches*. Boston, MA: Allyn & Bacon. (NOTE: I refer to this text throughout the syllabus as "Neuman." This text is also available on reserve at Perkins library).
- Miller, Jane E. 2005. *The Chicago Guide to Writing about Multivariate Analysis*. Chicago, IL: University of Chicago Press. (NOTE: I refer to this text throughout the syllabus as "Miller." This text is also available on reserve at Perkins library).
- Assigned readings, cartoons, videos, and podcasts which are not in Neuman or Miller are available on Sakai or as a direct link through the syllabus.

## Course Outline

### Introductions and Background

#### 1. Thurs 1/11

- Read syllabus

- Familiarize yourself with the Sakai site
- Take in-class survey

## Unit 1: Asking Questions

### 1. \*Tues 1/16 - What research questions do scientists ask?

- Hamblin, James. 2017. "Science Has Begun Taking Gluten Seriously." *The Atlantic*.
- Barry-Jester, Anna Maria. 2016. "How MSG Got A Bad Rap: Flawed Science and Xenophobia." *FiveThirtyEight*.
- Wessel, Lindzi. 2017. "Four Vaccine Myths and Where They Came From." *Science Magazine*.
- Blancke, Stefaan. 2015. "Why People Oppose GMOs Even Though Science Says They are Safe." *Scientific American*.

### 2. \*Thurs 1/18 - Who gets to do research?

- Finkelstein, Martin J., Valerie Martin Conley, and Jack H. Schuster. 2016. "Taking the Measure of Faculty Diversity." *TIAA Institute - Advancing Higher Education*.
- Ayoub, Phillip and Deondra Rose. 2016. "In Defense of 'Me' Studies." *Inside Higher Ed*.
- S.K. 2015. "The Thinking Behind Feminist Economics." *The Economist*.
- Fedigan, Linda Marie and Laurence Fedigan. 1989. "Gender and the Study of Primates." Pp. 41-46 in *Gender and Anthropology: Critical Reviews for Research and Teaching*, S. Morgen, editor. Washington, DC: American Anthropological Association.

### 3. \*Tues 1/23 - How science gets made: the funding and publication process

- "Who Pays for Science?" *UC Berkeley's 'Understanding Science' Project*. [http://undsci.berkeley.edu/article/who\\_pays](http://undsci.berkeley.edu/article/who_pays)
- "Publish or Perish?" *UC Berkeley's 'Understanding Science' Project*. [http://undsci.berkeley.edu/article/0\\_0\\_0/howscienceworks\\_15](http://undsci.berkeley.edu/article/0_0_0/howscienceworks_15)
- "Scrutinizing Science: Peer Review" *UC Berkeley's 'Understanding Science' Project*. [http://undsci.berkeley.edu/article/0\\_0\\_0/howscienceworks\\_16](http://undsci.berkeley.edu/article/0_0_0/howscienceworks_16)
- Editors. 2011. "Dr. No Money: The Broken Science Funding System." *Scientific American*.
- "What Role Does Peer Review Play in the Publication of Articles and in Grant Applications?" *Columbia University's Responsible Authorship and Peer Review*. [http://ccnmtl.columbia.edu/projects/rcr/rcr\\_authorship/foundation/#4](http://ccnmtl.columbia.edu/projects/rcr/rcr_authorship/foundation/#4)
- "What Are the Potential Problems in Peer Review?" *Columbia University's Responsible Authorship and Peer Review*. [http://ccnmtl.columbia.edu/projects/rcr/rcr\\_authorship/foundation/#5](http://ccnmtl.columbia.edu/projects/rcr/rcr_authorship/foundation/#5)

4. \*Thurs 1/25 - Where science gets made: universities, think tanks, and private research

- Gibbons et al. 1994. "Mode 2 (Introduction)." Pp. 1-11 in *The New Production of Knowledge: The Dynamics of Science and Research in Contemporary Societies*. Thousand Oaks, CA: Sage.
- Medvetz, Thomas. 2012. "Gaining Ground: The Rise of the Policy Expert." Pp. 1-7 in *Think Tanks in America*. Chicago, IL: University of Chicago Press.

5. \*Tues 1/30 - The public reception of research and science

- Bohannon, John. 2015. "I Fooled Millions Into Thinking Chocolate Helps Weight Loss. Here's How." *Gizmodo*.
- Fjoestad, Bjorn. 2007. "Why Journalists Report Science as They Do." Pp. 123-131 in *Journalism, Science and Society: Science Communication between News and Public Relations*, Martin W. Bauer and Massimiano Bucchi, editors. New York, NY: Taylor and Francis Group.
- Murray, David, Joel Schwartz, and S. Robert Lichter. 2001. "Hard to Tell: The Culture of News Stories." Pp. 185-189 in *It Ain't Necessarily So: How Media Make and Unmake the Scientific Picture of Reality*. Lanham, MD: Rowman and Littlefield.

6. \*Thurs 2/1 - Confirmation bias and the politicization of science

- Watch "Confirmation Bias." <https://www.youtube.com/watch?v=6xMaR8au-YU>
- The Oatmeal. 2017. "The Backfire Effect." [http://theoatmeal.com/comics/believe\\_clean](http://theoatmeal.com/comics/believe_clean)
- Gauchat, Gordon. 2012. "Politicization of Science in the Public Sphere: A Study of Public Trust in the United States, 1974 to 2010." *American Sociological Review* 77(2):167-187.
- Shi et al. 2017. "Millions of Online Book Co-Purchases Reveal Partisan Differences in the Consumption of Science." *Nature Human Behavior* 1(0079):1-9. **Focus on pages 1-6.**

## Unit 2: Designing Studies

1. Tues 2/6 - Making and testing theories

- Pp. 61-78 in Neuman.

2. Thurs 2/8 - Types of research design

- "Research Design in Sociology." Section 2.3 in *Sociology: Understanding and Changing the Social World*. <http://open.lib.umn.edu/sociology/chapter/2-3-research-design-in-sociology/>
- Peruse Chapters 9 (Experimental Research), 10 (Survey Research), 11 (Nonreactive Research and Secondary Analysis), 13 (Field Research and Focus Group Research), and 14 (Historical-Comparative Research) in Neuman.

3. \*Tues 2/13 - When science becomes science: falsification and paradigms
  - Sections 1-4 in “Science and Pseudo-Science.” *Stanford Encyclopedia of Philosophy*. <https://plato.stanford.edu/entries/pseudo-science/>
  - Watch “Karl Popper, Science, and Pseudoscience.” <https://www.youtube.com/watch?v=-X8Xf10JdTQ>
  - Watch “An Introduction to Thomas Kuhn’s ‘The Structure of Scientific Revolutions’.” [https://www.youtube.com/watch?v=O\\_oDFvklkyY](https://www.youtube.com/watch?v=O_oDFvklkyY).
4. \*Thurs 2/15 - When science becomes science: the social construction of facts
  - Latour, Bruno, and Steve Woolgar. 1979. “From Order to Disorder.” Pp. 15-42 in *Laboratory Life: The Construction of Scientific Facts*. Princeton, NJ: Princeton University Press.
  - Listen to “Boss Hua and the Black Box” episode from the *Undiscovered* podcast. <http://www.undiscoveredpodcast.org/boss-hua-and-the-black-box.html>.

### Unit 3: Getting the Data

1. Tues 2/20 - Measures and measurement
  - Pp. 198-239 in Neuman.
2. Thurs 2/22 - Samples and sampling
  - Pp. 240-273 in Neuman.
3. \*Tues 2/27 - Anecdotal evidence and the “guy who” fallacy
  - Shermer, Michael. 2008. “How Anecdotal Evidence Can Undermine Scientific Results.” *Scientific American*.
  - Watch “Food Stamp Enrollment Surge” news clip [https://www.youtube.com/watch?v=bP\\_izYhdehY](https://www.youtube.com/watch?v=bP_izYhdehY)
  - Ferdman, Roberto A. 2015. “Missouri Republicans are Trying to Ban Food Stamp Recipients from Buying Steak and Seafood.” *Washington Post*.
  - Delaney, Arthur and Alissa Scheller. 2015. “Think People on Food Stamps are Eating More Lobster Than You? Think Again.” *Huffington Post*.
4. \*Thurs 3/1 - Outliers and exceptionalism
  - Osborne, Jason W. and Amy Overbay. 2004. “The Power of Outliers (and Why Researchers Should Always Check for Them).” *Practical Assessment, Research, and Evaluation*. 9(6):1-8.
  - Jung et al. 2014. “Female Hurricanes are Deadlier Than Male Hurricanes.” *Proceedings of the National Academy of Sciences* 111(24):8782-8787.

- Holthaus, Eric. 2014. "Hurricanes Named After Women Are More Dangerous? Not So Fast" *Slate*.

## 5. \*Tues 3/6 - Generalizing from a limited sample

- Beery, Annaliese K. and Irving Zucker. 2012. "Sex Bias in Neuroscience and Biomedical Research." *Neuroscience Biobehavior Review* 35(3):565-572. **Focus on the highlighted sections: abstract, introduction, 'present state and implications of sex bias' and 'implications for individual diseases' sections.**
- Henrich, Joseph, Steven J. Heine and Ara Norenzayan. 2010. "The Weirdest People in the World?" *Behavioral and Brain Sciences* 33:61-35. **Focus on the highlighted sections: 1 (introduction), 2 (background), 3.7 (summary of contrast 1), 4.7 (summary of contrast 2), 5.3 (summary of contrast 3), 6.5 (summary of contrast 4), and 7 (general discussion).**
- Butler, Declan. 2013. "When Google Got Flu Wrong." *Nature News*.

## 6. Thurs 3/8 - Midterm exam

- In class midterm exam

## 7. \*Tues 3/20 - Selection on the dependent variable

- Geddes, Barbara. 1990. "How the Cases You Choose Affect the Answers You Get: Selection Bias in Comparative Politics." *Political Analysis* 2:131-150. **Focus on the highlighted sections on pages 131-141 and 148-149.**
- Stanley, Thomas J. and William D. Danko. 1996. "Introduction." Pp. 1-5 in *The Millionaire Next Door: The Surprising Secrets of America's Wealthy*. Lanham, MD: Taylor Trade Publishing.
- Botelho et al. 2017. "What Sets Successful CEOs Apart." *Harvard Business Review*.

## 8. \*Thurs 3/22 - Lack of a (valid) comparison group

- Clinks. nd. "Using Comparison Group Approaches to Understand Impact." Pp. 2-5. in *Improving Your Evidence*.
- Fordham, Signithia and John U. Ogbu. 1986. "Black Students' School Success: Coping with the "Burden" of 'Acting White'." *The Urban Review* 18(3):176-206. **Focus on the highlighted sections: abstract and "'Acting White' at Capital High."**
- Tyson, Karolyn. 2011. "Abstract" and "Introduction." Pp. 1-8 in *Integration Interrupted: Tracking, Black Students, and Acting White after Brown*. New York, NY: Oxford University Press.

## 9. \*Tues 3/27 - Issues of operationalization

- Babbie, Earl. 2016. "Conceptualization, Operationalization, and Measurement." Pp. 121-132 in *The Practice of Social Research* Boston, MA: Cengage.

- Regnerus, Mark. 2012. “How Different are the Adult Children of Parents Who Have Same-Sex Relationships? Findings from the New Family Structures Study.” *Social Science Research* 41:752-770. **Focus on highlighted sections on pages 752-753, 757-758, and 764-766.**
- Cheng, Simon and Brian Powell. 2015. “Measurement, Methods, and Divergent Patterns: Reassessing the Effects of Same-Sex Parents.” *Social Science Research*. 52:615-626. **Focus on highlighted sections on pages 615-618.**

## Unit 4: Telling Causal Stories

### 1. Thurs 3/29 - The conditions of causality

- Pp. 180-192 in Neuman.
- Pp. 34-39 in Miller.

### 2. \*Tues 4/3 - The omitted variable problem

- Johnson, R. Burke and Larry Christensen. 2014. “Applying the Three Required Conditions for Causation in Nonexperimental Research.” Pp. 392-400 in *Educational Research: Quantitative, Qualitative, and Mixed Approaches*. Thousand Oaks, CA: Sage.
- “Spurious Correlations.” <http://www.tylervigen.com/spurious-correlations>.
- Schneps, Leila and Coralie Colmez. 2013. “The Berkeley Sex Bias Case: Discrimination Detection.” Pp. 109-120 in *Math on Trial: How Numbers Get Used and Abused in the Courtroom*. New York, NY: Basic Books.

### 3. \*Thurs 4/5 - Reverse causation

- Watch “Reverse Causality.” <https://www.coursera.org/learn/wharton-people-analytics/lecture/VGoQn/reverse-causality>.
- Flegal et al. 2005. “Excess Deaths Associated with Underweight, Overweight, and Obesity.” *Journal of the American Medical Association* 293(15):1861-1867.
- Kolata, Gina. 2005. “Some Extra Heft May Be Helpful, New Study Says.” *New York Times*.
- Harvard School of Public Health. nd. “Obesity Controversy.” *The Nutrition Source*.

### 4. \*Tues 4/10 - Treatment versus selection effects

- Gladwell, Malcolm. 2005. “Getting In: The Social Logic of Ivy League Admissions.” *The New Yorker*.
- Stanley, Scott M. 2014. “The Hidden Risk of Cohabitation.” *Psychology Today*.
- Jay, Meg. 2012. “The Downside of Cohabiting Before Marriage.” *New York Times*.
- Axinn, William G. and Arland Thornton. 1992. “The Relationship between Cohabitation and Divorce: Selectivity or Causal Influence?” *Demography* 29(3):357-374. **Focus on highlighted sections in abstract, introduction, and conclusion.**
- Kuperberg, Arielle. 2014. “Does Premarital Cohabitation Raise Your Risk of Divorce?” *Council of Contemporary Families Brief Report*.

## Unit 5: Drawing Conclusions, Making Implications

1. Thurs 4/12 - Significance testing and false positives/negatives
  - Neuman pp. 412-416.
  - “Type I and Type II Errors - Making Mistakes in the Justice System.” **Make sure to play with the Applet at the bottom of the page.** <http://intuitor.com/statistics/T1T2Errors.html>.
  - “Significant” *xkcd*. **Read the cartoon and explanation.** [https://www.explainxkcd.com/wiki/index.php/882:\\_Significant](https://www.explainxkcd.com/wiki/index.php/882:_Significant)
  
2. \*Tues 4/17 - Substantive importance versus statistical significance
  - Miller pp. 41-48.
  - Cacioppo et al. 2012. “Marital Satisfaction and Break-Ups Differ Across On-line and Off-line Meeting Venues.” *Proceedings of the National Academy of Sciences* 110(25):10135-10140.
  - Nuzzo, Regina. 2013. “Online Daters do Better in the Marriage Stakes.” *Nature News*.
  
3. \*Thurs 4/19 - Relativity
  - Miller pp. 204-206.
  - Grimes, David A. and Kenneth F. Schulz. 2008. “Making Sense of Odds and Odds Ratios.” *Obstetrics & Gynecology* 111(2):423-426.
  - Murray, David, Joel B. Schwartz and S. Robert Lichter. 2001. “Is the Glass Half Empty or Half Full?” Pp. 85-93 in *It Ain't Necessarily So: How Media Make and Unmake the Scientific Picture of Reality*. Lanham, MD: Rowman and Littlefield.
  
4. \*Tues 4/24 - Replicability
  - Nosek et al. 2015. “Estimating the Reproducibility of Psychological Science.” *Science* 349(6251):943.
  - Chin, Jason M. 2014. “Psychological Science’s Replicability Crisis and What It Means for Science in the Courtroom.” *Psychology, Public Policy, and Law* 20(3):225-238. **Focus on the highlighted sections on pages 225-228, 233-236.**
  - Watch “Your Body Language Shapes Who You Are” TED talk by Anne Cuddy [https://www.youtube.com/watch?v=Ks-\\_Mh1QhMc](https://www.youtube.com/watch?v=Ks-_Mh1QhMc).
  - Ranehill et al. 2015. “Assessing the Robustness of Power Posing: No Effect on Hormones and Risk Tolerance in a Large Sample of Men and Women.” *Psychological Science* 1-4.