

Science and Society: The Demarcation Problem

Fall, 2017

Class meetings: Monday 3rd & 4th period (11:00-12:50); Wed 4th period (12-12:50) Veritas Hall B TBD

[In] the autumn of 1919... I first began to grapple with the problem "When should a theory be ranked as scientific?" or "Is there a criterion for the scientific character or status of a theory?" The problem which troubled me at the time was neither, "When is a theory true?" nor, "When is a theory acceptable?" My problem was different. I wished to distinguish between science and pseudo-science; knowing very well that science often errs, and that pseudo-science may happen to stumble on the truth.

-Karl Popper

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Office: Veritas Hall B 430 **Office hours:** Wed (11-12; 1-2) and by appointment

Course Topic: The central theme of the course will be ways in which private industry distort scientific research and the extent to which industry-funded science can be relied upon. Industry funding has become the major source of income for scientific research. In addition to economic forces causing this trend, a number of non-profit and government agencies (e.g. the Gates Foundation, the Wellcome trust, the Food and Drug Administration, etc.) are recommending more collaboration between industry and academia. The entire field of biomedicine is undergoing a massive shift along these lines as pharmaceutical companies shift their R&D work into universities under the rubric of translational medicine. Similarly, most of the work assessing the safety of industrial chemicals is conducted by the companies that produce them. Yet concurrent with this shift towards industry funding, there has been growing concern with the ways in which industry has deliberately distorted scientific studies to produce results that serve their economic interest. This course examines industry-funded science and asks is really "science." In short, is there any principled line that we can draw between "real science" and "pseudoscience" (i.e. something that might look like science, but is really isn't). Philosophers the demarcation question. However, when philosophers talk about "pseudoscience" they consider cases like astrology or creationism. In this class we will first look at several cases of industry funded science and then look at many different answers to the demarcation question and ask if any of the answers help explain the problematic cases of industry-funded research.

Course Format: This class is designed to be a discussion based course. The goal is to create a dynamic class discussion in which students engage with each other and learn to engage in productive discussion. There will be NO EXAMS. Instead, students are expected to come to class each week prepared to engage in discussion. Grading will be based on in-class discussion and on a paper assignment that students will turn in multiple stages throughout the course. Students must keep pace with the weekly readings to do well in this course. Students who typically do not keep up with course readings or typically only read them as they "cram" for an exam, should understand that such strategies will likely lead to a low, if not a failing, grade.

1. **Policies:**

‡ **Grading:** There are 100 available points. The class is based on a relative grading scale according to Yonsei University grading policy. That means that classes with an enrollment of >20 can have at most 35% in the A-range and 35% in the B-range, and classes with an enrollment of ≤ 20 can have at most 40% in the A-range and 50% in the B-range. Since the Yonsei online grade-submission system will not accept (or even allow) submission of grades that violate these restrictions, I am required to follow these guidelines. Hence, I have refrained from giving letter grades on assignments and exams.

The default floor for the grading percentages will be:

	+	0	-
A	96	92.5	90
B	87.5	82.5	80
C	77.5	72.5	65
F		Below 65	

‡ **Attendance & Participation:**

Attendance will be taken in accordance with Yonsei Policy: missing 1/3 of all classes, regardless of having legitimate, official excuses, is to result in an F grade. Being more than twenty minutes late will be counted as an absence. You will be allowed six absences (excused/unexcused). Long days count as two classes. (Hence, you're allowed two weeks of absences).

Students are expected to come to class prepared and ready to engage in an informed discussion of the material. Students are expected to actively participate in classroom discussions. Participation includes asking questions, raising objections, offering defenses, commenting on the significance of a point, clarifying an argument or a claim, and drawing out the connections between an issue from our current discussion and issues raised in our other readings.

‡ **Extensions or alternative test times:** All assignments are due at the beginning of class. Students will have a ten minute grace period after which point the assignment will be considered late. Generally, no changes will be made to the dates listed. Exceptions will be handled on a case by case basis and will not, in any circumstances, be altered without supporting documentation. The penalty for turning in an assignment late will be a third of a grade deduction per day (or any portion thereof). It is the student's responsibility to ensure that the paper they submit is the correct paper. If the wrong paper is uploaded to the drop box it will be treated as if no paper had been turned in and late penalties will accrue accordingly.

‡ **Academic Integrity:** All students are expected to be familiar with and abide by the universities policies on academic integrity. Any failure to abide by this policy will result in a failing grade for the course and letter to the dean reporting the incident. For more information, please visit <http://uic.yonsei.ac.kr/> and navigate to Home>Academics>Academic Regulations.

‡ **Disabilities and Special Needs:** I am happy to make any accommodations to facilitate students learning. Please see me at the beginning of the semester to discuss such issues.

‡ **Preferred names and Gender Pronouns:** I would like to make every effort to create a safe space. If you have a preferred name or gender pronoun that is not reflected in the roster, please let me know.

‡ **This syllabus may be updated as the semester proceeds. Any such changes will be announced in class as well as by email.**

2. Participation (25%)

Active and informed participation: Students are expected to come to class prepared and ready to engage in an informed discussion of the material. Students are expected to actively participate in classroom discussions. Participation includes asking questions, raising objections, offering defenses, commenting on the significance of a point, clarifying an argument or a claim, and drawing out the connections between an issue from our current discussion and issues raised in our other readings.

3. Paper assignments (75%)

<u>Week</u>	<u>Assignment</u>	<u>Purpose</u>	<u>% of Grade</u>
2	Academic Honesty	The assignment presents students with 6 samples of student writing and the original source material. Students are ask to identify which examples display the ideals of academic honesty. If the student gets any wrong they must submit a correct answer and explanation by the next class to demonstrate they understand academic integrity (required to write the paper).	N/A
4	Paper prospectus	Students must meet with me to propose a possible topic for their argumentative paper. Students should come to their meeting with having identified both a topic and possible source material. The prospectus should outline the general arc of the argument and identify which sources they plan on drawing from AND generally how the sources contribute to the argument. The following week students are to turn in an abstract (300-500 words) that sketches their idea for the paper.	5%
6	Draft Due (Literature review)	Student should post their paper to yscec. The mid-term paper will be the “first half” of the longer paper they will write over the course. The paper will be 1700- 2400 words (but will incorporate some of the abstract). This paper will summarize and synthesize at least 5	25%

		articles on the student’s chosen topic (at least 3 from sources outside of class material). It will serve as the groundwork for the student’s original argument to be made in the “second half” of the paper. Unless the student obtains permission, the paper must be an elaborated version of the paper in the prospectus to receive credit.	
11	Draft Due (Original argument)	The student will turn in a full draft of the second half of their paper (original argument). The paper will be 1700- 2400 words (but will incorporate some of the abstract). This paper will make an original argument on a topic relating to the themes of the course, but chosen by the student. Unless the student obtains permission, the paper must be an elaborated version of the paper in the prospectus to receive credit.	25%
14	Finalize Argument	The student will put together both “halves” of the paper and add an introduction and a conclusion. Total paper length should be (4000-5000 words). Students should make sure that they address feedback from previous drafts.	20%

Paper specifics: Over the course of the class students will write 3 papers. Papers will lose 2 points for every 100 words (or any portion thereof) outside the limit). The papers will be spread out over the class. Students should make reference to (**and cite!**) the material, but should express the ideas in their own words (i.e. no long block quotes). Citations should be MLA style. Significant overlap in student papers is academic dishonesty

Week 1 (March 5/7): Karl Popper : Falsifiability as a solution to the Demarcation Problem

Popper, K. (1963) *Conjectures and refutations*

Week 2 (March 12/14): The Manufacture of Doubt (48 pages)

Michaels, D. (2008). *Doubt is Their Product*. Introduction –Chapter 4

Week 3 (March 19/21): Tricks of the Trade: How to confuse the public (42 pages)

Michaels, D. (2008). *Doubt is Their Product*. Chapter 5-Chapter 8

Week 4 (March 26/28): Getting away with murder: How to kill with popcorn (63 pages)

Michaels, D. (2008). *Doubt is Their Product*. Chapter 9-Chapter 12

Week 5 (April 2/4): The Institutionalization of Ignorance (50 pages)

Michaels, D. (2008). *Doubt is Their Product*. Chapter 13-Chapter 15

Week 6 (April 9/11): DRAFT OF FIRST HALF OF PAPER

NO (Required) READING- STUDENTS REFLECT ON BOOK, PREPARE THEIR FIRST HALF PAPER

Optional: Michaels, D. (2008). *Doubt is Their Product*. Chapter 16-Chapter 18

Paper due on Friday

Week 7 (April 16/18): Thomas Kuhn: Puzzle Solving as a solution to the Demarcation Problem (30 pages)

Hansson, Sven "Science and Pseudoscience" <https://plato.stanford.edu/entries/pseudo-science/>

Link to papers in summary: <https://philpapers.org/sep/pseudo-science/?refresh=1>

Kuhn, Thomas S., 1974. "Logic of Discovery or Psychology of Research?", pp. 798–819 in P.A. Schilpp, *The Philosophy of Karl Popper*, The Library of Living Philosophers, vol xiv, book ii. La Salle: Open Court.

Week 8 (April 23-25) Mid-term Week

NO WORK!!!!

Week 9 (April 30/May 2): Imre Lakatos: Progress as a Solution to the Demarcation Problem (27 pages)

Lakatos, I. 1974b. "Science and pseudoscience", *Conceptus*, 8: 5–9.

Thagard, Paul R., 1978. "Why Astrology Is a Pseudoscience", *Philosophy of Science Association (PSA 1978)*, 1: 223–234. Thagard, Paul R., 1978.

Rothbart, Daniel, 1990 "Demarcating Genuine Science from Pseudoscience", pp 111–122 in Patrick Grim, ed, *Philosophy of Science and the Occult*, 2nd ed, Albany: State University of New York Press.

Week 10 (No class May 7/9): Dolby & Ruse: Social norms as a Solution to the Demarcation Problem (31 pages)

Ruse, M. , 2000. "Is evolutionary biology a different kind of science?", *Aquinas*, 43: 251–282

Week 11 (May 14/16): DRAFT OF SECOND HALF OF PAPER

NO READING- STUDENTS REFLECT ON READINGS, PREPARE THEIR SECOND HALF PAPER

Paper due on Friday

Week 12 (May 21/23): Combination approaches (39 pages)

Derksen, A. A., 2001. "The seven strategies of the sophisticated pseudoscience: a look into Freud's rhetorical tool box", *Journal for General Philosophy of Science*, 32: 329–350.

Resnik, D. B. (2000). A pragmatic approach to the demarcation problem. *Studies in History and Philosophy of Science Part A*, 31(2), 249-267.

Week 13 (May 28/30): The news of my demise have been greatly exaggerated (35 pages)

Laudan, Larry, 1983. "The demise of the demarcation problem", pp. 111–127 in R.S. Cohan and L. Laudan (eds.), *Physics, Philosophy, and Psychoanalysis*, Dordrecht: Reidel.

Pigliucci, Massimo, 2013. "The demarcation problem. A (belated) response to Laudan", in Pigliucci and Boudry (eds.) 2013, pp. 9–28.

Week 14: (no class June 4/6):

NO READING- STUDENTS REFLECT ON COURSE, PREPARE THEIR FINAL PAPER

Paper due on Friday

Readings I wish I could have assigned, but didn't

Progress

Popper, 1974 "Reply to my critics", in P.A. Schilpp, *The Philosophy of Karl Popper* (The Library of Living Philosophers, Volume XIV, Book 2), La Salle: Open Court, pp. 961–1197 (only the part of these pages that responds to Kuhn)

norms

Dolby, R.G.A., 1987. "Science and pseudoscience: the case of creationism", *Zygon*, 22: 195–212.

(combination)

Gruenberger, Fred J., 1964. "A measure for crackpots", *Science*, 145: 1413–1415.

Langmuir, Irving, [1953] 1989. "Pathological Science", *Physics Today*, 42/10: 36–48.

Bunge, Mario, 1982. "Demarcating Science from Pseudoscience", *Fundamenta Scientiae*, 3: 369–388.

Grove, J.W., 1985. "Rationality at Risk: Science against Pseudoscience", *Minerva*, 23: 216–240.

Glymour, Clark and Stalker, Douglas, 1990. "Winning through Pseudoscience", pp 92–103 in Patrick Grim (ed.) *Philosophy of Science and the Occult*, 2nd ed, Albany: State University of New York Press.

Dutch, Steven I, 1982. "Notes on the nature of fringe science", *Journal of Geological Education*, 30: 6–13.