**Science and Society: The Demarcation Problem**

Spring, 2018

**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 goals 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%)**

**3. Topic papers (75%):** Over the course of the class students will write 3 papers (950-1450 words—roughly 3-4 pages), papers will lose 3 points for every 100 words (or any portion thereof) outside the limit). The papers will be spread out over the class. The prompts are focused on clarifying the topic and understanding the arguments covered in the reading. 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. The purpose of these papers is to learn to digest and understand philosophic arguments (i.e. these are not research papers). Accordingly, students **should not** use outside resources to answer questions. Evidence of outside research will be considered cause to reduce a grade, or in extreme cases lose all credit. Students may confer with each other, but all writing should be done independently. Significant overlap in student papers is academic dishonesty (see below).

**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): Does the scientific community regulate itself?**

**(Chapter 1 & 2 of *Bending Science* (43 pages))**

In this week we begin a new book which explores range of sophisticated legal and financial tactics that are used to suppress or discredit research on chemical safety that threatens corporate profits

**Week 3 (March 19/21): Inconvenient truths**

**(Chapter 3 & 4 of *Bending Science* (53 pages))**

In this week we examine the extent to which Industry is able to set the research agenda for scientific inquiry and the pursuit of scientific truth and the extent to which peer-review, competitive grant and the tenure process effectively regulates scientific inquiry and the pursuit of scientific truth.

**Week 4 (March 26/28): Playing Hide and Don’t Seek**

**(Chapter 5 & 6 of *Bending Science* (59 pages))**

In this week we examine two strategies industry takes in dealing with evidence that its products are harmful: obscuring evidence from public view and discrediting the studies.

Paper handed out Wednesday

**Week 5 (April 2/4): FIRST PAPER**

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

Optional: **(Chapter 11 & 12 of *Bending Science* (40 pages))**

In this week we examine zoom out to consider what sort of political reforms could be taken to reform industry-funded science.

Paper due on Monday

**Week 6 (April 9/11): Spin and Counter-spin**

**(Chapter 9 & 10 of *Bending Science* (55 pages))**

In this week we examine how industry manipulates the public discourse about scientific findings and what we, as citizens can do about it.

**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.

Paper handed out Wednesday

**Week 10 (No class May 7/9): SECOND PAPER**

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

Paper due on Monday

**Week 11 (May 14/16): 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 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 has 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.

Paper received Wednesday

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

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

Paper due on Wednesday

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, 1146–1147ish)

**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.