

## Philosophy 220 – Philosophy and the Sciences – Fall, 2015

### Elliott Sober and Emi Okayasu

This is a first course in philosophy of science, aimed at undergraduates who are interested in science. There are no prerequisites. The course helps fulfill Humanities and Social Science distribution requirements. The goal of the course is to understand what makes science tick. The course is divided into four sections. The first concerns the ABCs of deductive logic and probability reasoning. The second addresses the question “what is science?” as it pertains to the on-going conflict between evolutionary biology and creationism/intelligent design. The third involves a survey of some standard topics in philosophy of science – the justification of induction, the nature of explanation, the question of whether scientific evidence ever supports claims about unobservable entities, and the difference between normal scientific change and scientific revolutions. The fourth topic concerns the role of ethical and political values in scientific practice.

#### Requirements:

Attendance at all lectures and at your scheduled weekly section, and participation in discussion, are required and will affect your grade. There will be two in-class exams and two essays. Each essay will be on an assigned topic and should be 4-5 double-spaced typed pages. Some brief writing projects may be assigned in sections. There may be unannounced quizzes. Completion of all assignments is a requirement for passing the course.

#### Office Hours:

ES’s office hours are Thursday 2:30-4:30, or by appointment, in 5199 Helen C. White Hall.  
EO’s office hours are Tuesday 2:30-4:30 in 5142 Helen C. White Hall.

#### Books available at University Bookstore (and on reserve at College Library):

Ian Hacking, *An Introduction to Probability and Inductive Logic*, Cambridge University Press, 2001. (= H)  
Samir Okasha, *Philosophy of Science – A Very Short Introduction*, Oxford University Press, 2002. (= O)

Schedule of Readings and Assignments

Week	Dates	Topics	Readings
1	9/3	Logic	H (chs 1,2)
2	9/8, 9/10	The ABCs of probability	H (chs 3,4,5, then 6,7)
3	9/15, 9/17	Bayesianism	H (chs 11,12,15)
4	9/22,9/24	Frequentism: significance tests, Neyman-Pearson hypothesis testing, and confidence intervals	H (chs 16, 17, 18), H (ch 19)
5	9/29	Hot Hands and “cognitive illusions”	“The Birthday Problem” Wikipedia, <a href="https://en.wikipedia.org/wiki/Birthday_problem">https://en.wikipedia.org/wiki/Birthday_problem</a>  Gilovich, T., Valone, R., and Tversky, A. (1985): “The Hot Hand in Basketball – On the Misperception of Random Sequences.” <i>Cognitive Psychology</i> 17: 295-314.
5	10/1	Causation, correlation, and apportioning causal responsibility.	<a href="http://www.americanscientist.org/issues/pub/what-everyone-should-know-about-statistical-correlation">Vladica Velickovic</a> , “What Everyone Should Know about Statistical Correlation.” <i>American Scientist</i> , 2015, <a href="http://www.americanscientist.org/issues/pub/what-everyone-should-know-about-statistical-correlation">http://www.americanscientist.org/issues/pub/what-everyone-should-know-about-statistical-correlation</a> .  Tyler Vigen, “Spurious Correlations,” <a href="http://www.tylervigen.com/spurious-correlations">http://www.tylervigen.com/spurious-correlations</a>

			Anahad O'Connor, "Coca-Cola Funds Scientists Who Shift Blame for Obesity Away From Bad Diets." <i>New York Times</i> , August 10, 2015, page 1.
6	10/6	<b>First Exam</b>	
6	10/8	The Design Argument and Evolutionary Theory	Paley, excerpt from <i>Natural Theology</i> ; "Evolution" and "Natural Selection" in <i>Wikipedia</i> .
7	10/13	Imperfect Adaptations, Common Ancestry, and Irreducible complexity	Wikipedia articles on "Irreducible complexity," "Common Descent", and "Evidence of Common Descent" in <i>Wikipedia</i> .
7-8	10/15-10/20	The Demarcation Problem and McLean v Arkansas	Okasha, ch 1; "Establishment Clause" in <i>Wikipedia</i> . Michael Ruse, "Witness Testimony Sheet, McLean v Arkansas"; Larry Laudan, "The Demise of the Demarcation Criterion" and "Science at the Bar; Michael Ruse, "Pro Judice." Laudan, "More on Creationism."
8	10/22	Methodological naturalism and Kitzmiller v Dover Area School District.	Sober, "What's wrong with ID?" and "Why Methodological Naturalism?" Judge Jones's opinion in Kitzmiller v Dover.
9	10/27	<b>First Essay Assignment Due</b>	
9	10/27,10/29	Problem of Induction	O (ch 2); H (ch 20-22)
10	11/3, 11/5	Explanation	O (ch 3); Woodward, "Explanation" in <i>Stanford Encyclopedia of Philosophy</i>
11	11/10,11/12	Scientific Realism	O (ch 4); Chakravartty, "Scientific Realism" in <i>Stanford Encyclopedia of Philosophy</i> (sections 1-3); Sober, "Empiricism."
12	11/17,11/19	Scientific Change and Revolutions	O (chs 5 and 7). Bird, "Thomas Kuhn" in <i>Stanford Encyclopedia of Philosophy</i> . Kuhn (1977) "Objectivity, Value Judgment, and Theory Choice." In <i>The Essential Tension – Selected Studies in Scientific Tradition and Change</i> . Chicago: University of Chicago Press, pp. 320–339.
13	11/24	<b>Second Exam</b>	
14	12/1, 12/3	Decision theory	H (chs 8-10)
15	12/8	Fact/Value and Is/Ought distinctions	<i>Wikipedia</i> , <a href="https://en.wikipedia.org/wiki/Fact%E2%80%93value_distinction">https://en.wikipedia.org/wiki/Fact%E2%80%93value_distinction</a> . <i>Wikipedia</i> , <a href="https://en.wikipedia.org/wiki/Is%E2%80%93ought_problem">https://en.wikipedia.org/wiki/Is%E2%80%93ought_problem</a>
15	12/10	Are ethical values relevant to whether hypotheses should be accepted or rejected?	R. Rudner, "The scientist qua scientist makes value judgments," <i>Philosophy of Science</i> , 1953; R. Jeffrey, "Valuation and acceptance of scientific hypotheses," <i>Philosophy of Science</i> , 1956; I. Levi, "Must the scientist make value judgments?" <i>Journal of Philosophy</i> , 1960.
16	12/15	Stein's paradox	B. Efron and C. Morris, "Stein's Paradox in Statistics." <i>Scientific American</i> 236 (5): 119–127, 1977.
<b>Second essay due on day of scheduled final</b>			