

## GRADUATE PHILOSOPHY OF SCIENCE CORE COURSE

(PHIL 2600/HPS 2501)

FOR A COPY OF THE FINAL EXAM:

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COURSE LEVEL: Graduate

TERM: Fall

ACADEMIC YEAR: 2001-2

CLASS DAY/TIME: Wednesdays 3:00-5:30pm

DATES: Aug. 29-Dec. 12 (excluding Nov. 21 for Thanksgiving)

LOCATION: Wilfred Sellars Room, 1001CL

INSTRUCTOR: Rob Clifton, Dept. of Philosophy

Office: CL 1009E

Office Hours: By appointment on Wednesdays and Thursdays

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PREREQUISITES: NONE, however this course is limited to graduate students in Philosophy and History and Philosophy of Science, except by written permission of the instructor.

COURSE DESCRIPTION: This year's course is motivated by the desire to discern what makes scientific knowledge privileged or special as compared to other forms of knowledge. Accordingly, we shall primarily focus on the following two main problem areas in the philosophy of science:

- (i) The demarcation problem (what characterizes the scientific enterprise as compared to 'pseudoscience', metaphysics, religion, etc.).
- (ii) The nature of scientific explanation (laws, causality, epistemic vs. ontic conceptions of explanation, etc.).

The reading materials will all be drawn from major classics and important contemporary works.

NOTES ABOUT THE READINGS:

1) There are a large number of readings listed below, which unfortunately cannot all be discussed in class. On average we shall only be able to cover about 4 readings per class, and the readings that we shall plan to focus on will be announced one week in advance of the relevant class meeting *at the top of this webpage in green* (see also the 'CLASS SCHEDULE' published below).

2) It is the responsibility of the student to keep up with the readings that are discussed in class. In particular, students who take the final exam will find that studying for it will be made far easier if they maintain a good set of notes on these readings.

3) Students who take the final exam will only be responsible for the material in the readings that are actually discussed in class. Still, should it not be possible for the instructor to cover the whole of a certain article or chapter in class (due to lack of time), the student will still be held responsible for the *entire* article/chapter on the final exam.

4) Students should make every effort to study the readings below that are not actually discussed in class, because the readings have been chosen with a view to supplying important background information for writing term papers.

#### COURSE TEXT:

Wesley Salmon, *Four Decades of Scientific Explanation*, 1989 (provided free to each student, compliments of Professor Salmon)

#### ADDITIONAL READINGS:

The following additional readings are available for photocopying in the steel drawers in 1001CL. Each has been designated a number to make locating the article easier.

### INTRODUCTORY READINGS

1. P. Feyerabend, 'Has the Scientific View of the World a Special Status Compared with Other Views?', from J. Hilgevoord (ed.), *Physics and Our View of the World*, 1994
2. W. Salmon, 'The Importance of Scientific Understanding', from his *Causality and Explanation*, 1998.

### THE DEMARCATION PROBLEM

#### Science vs. Metaphysics

3. O. Neurath, 'Unified Science as Encyclopedic Integration', from O. Neurath, R. Carnap, and C. Morris (eds.), *Foundations of the Unity of Science, Vol. I*.
4. R. Carnap, 'The Elimination of Metaphysics Through Logical Analysis of Language', *Erkenntnis*, 1932; R. Carnap, 'Philosophy and Logical Syntax', from his book of the same name, 1935.

#### The Scientific Method and Falsifiability

5. K. Popper, excerpts from his *The Logic of Scientific Discovery*
6. K. Popper, excerpt from his *Conjectures and Refutations: The Growth of Scientific Knowledge*, 1963
7. I. Lakatos, 'Falsification and the Methodology of Scientific Research Programs', from I. Lakatos and A. Musgrave (eds.), *Criticism and the Growth of Knowledge*, 1970.
8. J. Agassi, 'Popper's Demarcation of Science Refuted', *Methodology and Science*, 1991

### Analysis of Specific (Alleged) Pseudosciences

9. A. Gr?nbaum, 'Is Psychoanalysis a Pseudo-Science? Karl Popper versus Sigmund Freud. Part I', *Zeitschrift f?r philosophische Forschung* , 1977
10. A. Gr?nbaum, 'Is Psychoanalysis a Pseudo-Science? Karl Popper versus Sigmund Freud. Part II', *Zeitschrift f?r philosophische Forschung* , 1978
11. P. Thagard, 'Why Astrology is a Pseudoscience', from P. Asquith and I. Hacking (eds.), *Proceedings of the Philosophy of Science Association Vol. I* , 1978.
12. A. Gr?nbaum, 'Is Freudian Psychoanalytic Theory Pseudo-Scientific by Karl Popper's Criterion of Demarcation?', *American Philosophical Quarterly* , 1979.
13. M. Ruse, 'Creation-Science is Not Science', *Science, Technology, and Human Values* , 1982.
14. L. Laudan, 'Commentary: Science at the Bar---Causes for Concern', *Science, Technology, and Human Values* , 1982
15. M. Ruse, 'Response to the Commentary: Pro Judice', *Science, Technology, and Human Values* , 1982
16. A. Gr?nbaum, 'The Degeneration of Popper's Theory of Demarcation', *Epistemologia* , 1989.
17. G. Reisch, 'Pluralism, Logical Empiricism, and the Problem of Pseudoscience', *Philosophy of Science* , 1998.

### Other Approaches to Demarcation

18. I. Lakatos, 'Science and Pseudoscience', from his *Philosophical Papers, Vol. 1* , 1977.
19. L. Laudan, 'The Demise of the Demarcation Problem', in Cohen and Laudan (eds.), *Physics, Philosophy and Psychoanalysis: Essays in Honour of Adolf Gr?nbaum* , 1983.
20. S. Fuller, 'The Demarcation of Science: A Problem Whose Demise Has Been Greatly Exaggerated', *Pacific Philosophical Quarterly* , 1985.
21. A. Lugg, 'Bunkum, Flim-Flam and Quackery: Pseudoscience as a Philosophical Problem', *Dialectica* , 1987.
22. P. Thagard, 'Pseudoscience', from his *Computational Philosophy of Science* , 1988.
23. R. Butts, 'Sciences and Pseudosciences: An Attempt at a New Form of Demarcation', J. Earman et al. (eds.), *Philosophical Problems of the Internal and External Worlds: Essays on the Philosophy of Adolf Gr?nbaum* , 1994.
24. D. Resnik, 'A Pragmatic Approach to the Demarcation Problem', *Studies in History and Philosophy of Science* , 2000.

### The Rationality/Objectivity of Science

25. T. Kuhn, 'Logic of Discovery or Psychology of Research?', from I. Lakatos and A. Musgrave (eds.), *Criticism and the Growth of Knowledge* , 1970.
26. P. Feyerabend, 'An Argument Against Method', from his *Against Method* , 1978.
27. A. Latour and S. Woolgar, 'The Social Construction of Scientific Facts', from their *Laboratory Life* , 1979.
28. C. Hempel, 'Valuation and Objectivity in Science', in Cohen and Laudan (eds.), *Physics, Philosophy and Psychoanalysis: Essays in Honour of Adolf Gr?nbaum* , 1983.

29. I. Hacking, 'The Rationality of Science After Kuhn', from his *Representing and Intervening* , 1983.
30. P. Feyerabend, 'Introduction' to his *Against Method* (rev. edition, 1988)
31. M. Eger, 'A Tale of Two Controversies: Dissonance in the Theory and Practice of Rationality', *Zygon* , 1988.
32. M. Hesse, ' "Rationality" in Science and Morals', *Zygon* , 1988.
33. A. Shimony, 'On Martin Eger's "A Tale of Two Controversies"', *Zygon* , 1988.
34. M. Bunge, 'A Critical Examination of the New Sociology of Science', *Philosophy of the Social Sciences* , 1992.

### **The Boundaries of Science/Science vs. Religion**

35. P. Duhem, 'Physics of a Believer', from the appendix to his *The Aim and Structure of Physical Theory* .
36. M. Midgley, 'Evolution as a Religion: A Comparison of Prophecies', *Zygon* , 1987.
37. A. O'Hear, 'Science and Religion', *The British Journal for Philosophy of Science* , 1993.
38. B. van Fraassen, 'Science, Materialism, and False Consciousness', from Jonathan Kvanvig (ed.), *Warrant in Contemporary Epistemology: Essays in Honor of Alvin Plantinga's Theory of Knowledge* , 1996.
39. B. van Fraassen, 'What is Science---and What Is It to Be Secular?', from his *The Empirical Stance* , forthcoming.

## **SCIENTIFIC EXPLANATION**

### **Survey Articles**

40. W. Salmon, 'Scientific Explanation', from M. Salmon et al. (eds.), *Introduction to the Philosophy of Science* , 1992
41. N. Koertge, 'Explanation and its Problems', *The British Journal for Philosophy of Science* , 1992.
42. J. Fetzer, 'Critical Notice of P. Kitcher and W. Salmon (eds.), Scientific Explanation and W. Salmon, Four Decades of Scientific Explanation', *Philosophy of Science* , 1991.
43. P. Railton, 'Explanation and Metaphysical Controversy', from P. Kitcher and W. Salmon (eds.), *Scientific Explanation* , 1989.

### **The Covering Law Model**

44. C. Hempel and P. Oppenheim, 'Studies in the Logic of Explanation', *Philosophy of Science* , 1948
45. N. Cartwright, 'The Truth Doesn't Explain Much', *American Philosophical Quarterly* , 1980.
46. M. Salmon, 'Explanation in the Social Sciences', from P. Kitcher and W. Salmon (eds.), *Scientific Explanation* , 1989.
47. R. Batterman, 'Explanatory Instability', *No?s* , 1992.

### **Statistical and Causal Explanation**

48. R. Braithwaite, 'Causal and Teleological Explanation', from his *Scientific Explanation* , 1960
49. T. Kuhn, 'Concepts of Cause in the Development of Physics', *Etudes d'?pist?mologie g?n?tique* , 1971.

50. W. Salmon, 'Why Ask, "Why?"? An Inquiry Concerning Scientific Explanation', *Proceedings and Addresses of the American Philosophical Association* , 1978
51. W. Salmon, 'Statistical Explanation and Its Models', from his *Scientific Explanation and the Causal Structure of the World* , 1984.
52. P. Humphreys, 'Scientific Explanation: The Causes, Some of the Causes, and Nothing But the Causes', from P. Kitcher and W. Salmon (eds.), *Scientific Explanation* , 1989.
53. J. Woodward, 'The Causal-Mechanical Model of Explanation', from P. Kitcher and W. Salmon (eds.), *Scientific Explanation* , 1989.
54. C. Hitchcock, 'Salmon on Explanatory Relevance', *Philosophy of Science* , 1995

### Explanation as Unification

55. M. Friedman, 'Explanation and Scientific Understanding', *The Journal of Philosophy* , 1974.
56. P. Kitcher, 'Explanatory Unification', *Philosophy of Science* , 1981.
57. P. Kitcher, 'Explanatory Unification and the Causal Structure of the World', from P. Kitcher and W. Salmon (eds.), *Scientific Explanation* , 1989.
58. E. Barnes, 'Explanatory Unification and the Problem of Asymmetry', *Philosophy of Science* , 1992.

### The Pragmatics of Explanation

59. B. van Fraassen, 'The Pragmatics of Explanation', *American Philosophical Quarterly* , 1977.
60. D. Sandborg, 'Mathematical Explanation and the Theory of Why-Questions', *The British Journal for Philosophy of Science* , 1998.

### Other Models of/Approaches to Explanation

61. P. Duhem, 'Representation vs Explanation in Physical Theory', from his *The Aim and Structure of Physical Theory*
62. E. McMullin, 'Structural Explanation', *American Philosophical Quarterly* , 1978.
63. M. Hesse, 'The Explanatory Function of Metaphor', from her *Revolutions and Reconstructions in the Philosophy of Science* , 1980.
64. R. Hughes, 'Theoretical Explanation', *Midwest Studies in Philosophy* , 1993.
65. R. Batterman, 'A "Modern" (=Victorian?) Attitude Towards Scientific Understanding', *The Monist* , 2000.
66. J. Woodward, 'Explanation and Invariance in the Special Sciences', *The British Journal for Philosophy of Science* , 2000.

ROUGH CLASS SCHEDULE:

DATE	TOPIC	READINGS
Aug. 29	Introduction	1, 2
Sept. 5	Science vs. Metaphysics; The Scientific Method & Falsifiability	4; 5--8
Sept. 12	Analysis of Specific (Alleged) Pseudosciences	11, 12, 14--17
Sept. 19	Other Approaches to Demarcation	18--21, 23
Sept. 26	The Rationality/Objectivity of Science	25--27, 29, 30, 34
Oct. 3	The Rationality/Objectivity of Science	28, 31-33
Oct. 10	The Boundaries of Science/Science & Religion	35, 38, 39
Oct. 17	The Covering Law Model	40, 41, 44; Salmon pp. ix--32
Oct. 24	The Covering Law Model	Salmon pp. 33-60; 45, 47
Oct. 31	Statistical and Causal Explanation [one term paper due]	Salmon pp. 61-89; 51, 61
Nov. 7	Statistical and Causal Explanation	Salmon Secs. 3.7, 4.1-4.3; 49, 50, 52, 53
Nov. 14	Explanation as Unification	Salmon Sec. 3.5; 55--57
Nov. 21	Thanksgiving Break	
Nov. 28	The Pragmatics of Explanation; Other Models of/Approaches to Explanation	Salmon Sec. 4.4; 59, 60
Dec. 5	Other Models of/Approaches to Explanation	12 and 16 (review!) and 66
Dec. 12	FINAL EXAM [all term papers due]	

## COURSE REQUIREMENTS:

2 papers (33% each) + final exam (33%) + freebee (1%)

OR

1 paper (50%) + final exam (50%)

OR

2 papers (50% each)

[NB: This third option is not open to History and Philosophy of Science students ]

Your final total numerical grade will be converted to a letter grade according to the scale below:

96-100 % = A+

92-95.9 % = A

88-91.9 % = A-

84-87.9 % = B+

80-83.9 % = B

76-79.9 % = B-

72-75.9 % = C+

68-71.9 % = C

64-67.9 % = C-

**Papers:** Any paper you write should be about either the problem of demarcation or about scientific explanation. If you are writing two papers, you may choose the same topic (i.e., demarcation or explanation) for both, provided there is little overlap between your discussions. Background material for the papers is provided by the readings that we shall follow in

class as well as those not covered in class . No paper should exceed 20 double-spaced pages in length (using a 12pt font, 1-inch margins). **All students must hand in one paper by our class on October 31.** (Any other papers must be handed in by the day of our final exam --- see below.)

**Final Exam: History and Philosophy of Science students must write the final exam, which will take place in-class on December 12 from 3:00-5:30pm.** This exam will consist of essay-type questions based on the readings discussed in class. To avoid unnecessary worries about what questions you will be choosing from, a sample exam will be made available one week in advance of the exam on December 5. Your instructor will then select some subset of the questions on this sample exam for the actual final exam.

[BACK TO ROB's MAIN PAGE](#)