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PHL 445.01: Central Issues in the Philosophy of Science

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Philosophy of Science

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Required Textbook: Curd and Cover, Philosophy of Science: The Central Issues (1st or 2nd edition)

Description: This is a survey course in philosophy of science. The course will introduce students to the main areas of general philosophy of science. Topics include: the demarcation problem (distinguishing science from pseudoscience); the role of rationality, objectivity and values in science; underdetermination of theory by evidence (the Duhem-Quine problem); Induction, prediction and evidence; confirmation; scientific explanation; and empiricism and scientific realism. Seminal papers on each of these topics will be read.

Learning Goals:

1. Students will be able to articulate alternative views associated with different categories, e.g. realism v. nominalism regarding universals.

2. Students will be able to articulate the arguments mustered for and against different views of categories, e.g. raise difficulties for realism regarding universals that nominalism can address and vice versa.

3. Students will be able raise their own criticisms of different views of categories and articulate how certain views fail to meet certain desiderata.

Grading and Exams:

20% attendance and participation, 20% presentations, 20% essay, 40% final paper.

Attendance: Attendance is mandatory. You get two unexcused absences. Additional unexcused absences will incur 5% reduction in final grade up to a total of 10%. Absences will be excused after the fact only in case of extreme circumstances that could not have been anticipated. Moreover, proof of extreme circumstances is required. Absences may be excused before the fact and is up to my discretion. In all cases, please talk to me about any foreseeable problems as soon as you anticipate them. I'm far more lenient when you are forthright about your problems.

Participation: Active participation is essential for learning philosophy. Our primary purpose in this class is to explore conceptual space by means of rational argumentation. I want to hear from you.

A range: The student is fully engaged and highly motivated. This student is well prepared, having read the assigned texts, and has thought carefully about the texts' relation to issues raised in lecture and section. This student's ideas and questions are substantive (either constructive or critical); they stimulate class discussions. This student listens and responds to the contributions of other students.

B range: The student participates consistently in discussion. This student comes to section well prepared and contributes quite regularly by sharing thoughts and questions that show insight and a familiarity with the material. This student refers to the materials discussed in lecture and shows interest in other students' contributions.

C range: The student meets the basic requirements of section participation. This student is usually prepared and participates once in a while but not regularly. This student's contributions relate to the texts and the lectures and offer a few insightful ideas, but do not facilitate a discussion.

Presentations: You will be required to present on two articles in class. These will be made in groups of two students. For your presentation you will have to have an excellent command of the article you are presenting on as you will be leading discussion. The presentations should have two parts: 1. A summary of the main problems the author(s) deal(s) with and their proposed solutions (taking not more than 1/2 hour) and 2. a set of problems formulated by your group for discussion. You should provide a handout (with your names written on it) to me and the class with a list of the problems for discussion. To be clear, a problem is a reason for thinking the author's argument is defective in some way, i.e. defective premises or weak inductive argument structure. In addition, some of your questions might relate the article being discussed to previous work we have discussed. I will expect to see a copy of your handout at least two days in advance of your presentation so I can give you feedback. I am happy to meet with you to help you understand what's going on in your presentation article.

A range: You present an accurate reconstruction of the problem that the author is dealing with, an accurate and charitable reconstruction of the arguments pertaining to that problem, and a careful criticism of the author's arguments via your discussion questions. You take an active role leading discussion of the paper by responding to student's comments. In particular, you will have anticipated responses to your discussion questions, especially how you think the author(s) might respond, and use those to draw out more elaborate comments about student's responses or to generate further discussion.

B range: You present a reasonable reconstruction of the problem that the author is dealing with, a charitable reconstruction of the arguments pertaining to that problem, and some criticism of the author's arguments via your discussion questions. You will lead discussion of the paper and respond to student's comments.

C range: You state the topic of the paper without articulating the problem that the author intends to address. You provide a summary of the paper (mere chronology without

isolating the main arguments). You provide discussion questions that are related to the text, but aren't primarily geared to addressing possible weaknesses in the author's argument. You ask questions, but don't develop discussion.

Essay: You will be required to write a brief essay ~800 words (give or take 100 words or so). The essay is due on March 4rth in class. I will assign an essay topic. The topic will be on material we have already covered in class. I will expect you to provide an analysis much like we do in class. Critically evaluate arguments, address the strengths and weaknesses of a particular position, etc. I will provide grading criteria when I hand out the essay topics.

Final Paper: You will be required to write a paper of at least 12 pages (12 pt font, normal margins, doublespaced) on a topic of your choosing. You must submit your paper topic along with an abstract by April 3rd. You must use at least one primary source (from a reputable collection of papers or philosophy journals) that we have not used in class (reference works, encyclopedia articles, etc. do not meet this requirement), in a non-trivial way. We will be workshopping the papers during the final two weeks of class. The essay will be due in the final exam period of class (11:30am Wednesday May 15th). The grading criteria will be discussed at a later date.

Classroom courtesy:

Please turn off cell phones when you come into class. If you have to leave early, please indicate that to me before class begins, and let me know why you must leave early.

Special Needs:

Students with disabilities will receive reasonable modifications in this course. Your responsibilities are to request them from me with sufficient advance notice, and to be prepared to provide verification of disability and its impact from Disability Services. Please speak with me after class or during my office hours to discuss the details. For more information, visit the Disability Services for Students website at www.umt.edu/dss/

Topics and Readings:

We'll try to average 2-3 papers a week. As such there will be +/- 1 class period of uncertainty regarding the date of your presentation. Prepare accordingly. We'll take the articles in order, deciding on what to cover at the end of class.

Science and Pseudoscience

Popper, Science: Conjectures and Refutations
Kuhn, Logic of Discovery or Psychology of Research?
Lakatos, Science and Pseudoscience
Thagard, Why Astrology Is a Pseudoscience
Ruse, Creation-Science Is Not Science

Laudan, Commentary: Science at the Bar - Causes for Concern
Ruse, Response to the Commentary: Pro Judice

Rationality, Objectivity and Values

Kuhn, The Nature and Necessity of Scientific Revolutions
Kuhn, Objectivity, Value Judgment, and Theory Choice
Laudan, Dissecting the Holist Picture of Scientific Change
Longino, Values and Objectivity

Duhem-Quine and Underdetermination

Quine, Two Dogmas of Empiricism
Laudan, Demystifying Underdetermination

Induction, Prediction, and Evidence

Popper, The Problem of Induction
Salmon, Rational Prediction
Hempel, Criteria of Confirmation and Acceptability
Snyder, Is Evidence Historical?
Achinstein, Explanation v. Prediction: Which Carries More Weight?

Confirmation and Relevance:

Salmon, Rationality and Objectivity in Science or Tom Kuhn Meets Tom Bayes
Chalmers, The Bayesian Approach
Horwich, Theraputic Bayesianism

Models of Explanation:

Carnap, The Value of Laws: Explanation and Prediction
Hempel, Two Basic Types of Scientific Explanation
Hempel, The Thesis of Structural Identity
Hempel, Inductive-Statistical Explanation
Railton, A Deductive-Nomological Model of Probabilistic Explanation
Kitcher, Explanatory Unification
Woodword, The Manipulability Conception of Causal Explanation

Empiricism and Scientific Realism:

Maxwell, The Ontological Status of Theoretical Entities
van Fraassen, Arguments Concerning Scientific Realism
Musgrave, Realism versus Constructive Empiricism
Laudan, A Confutation of Convergent Realism
Saatsi, On the Pessimistic Induction and Two Fallacies
Hacking, Experimentation and Scientific Realism
Carrier, What is Right with the Miracle Argument
Stanford, "Pyrrhic Victories for Scientific Realism", Journal of Philosophy 100: 553-572.
Stanford, "An Antirealist Explanation of the Success of Science", Philosophy of Science 67: 266-284.